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TECHNICAL ASSOCIATION OF THE
PULP AND PAPER INDUSTRY

NBSIR 80-1825

COLLABORATIVE REFERENCE PROGRAM
FOR PAPER

REPORT NO. 62S
STRENGTH TESTS



U.S. DEPARTMENT OF COMMERCE
National Bureau of Standards

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1980

NBS COLLABORATIVE REFERENCE PROGRAMS

TAPPI Paper and Board (6 times per year)

Bursting strength	Smoothness
Tearing strength	Surface pick strength
Tensile breaking strength	K & N ink absorption
Elongation to break	Moisture content
Tensile energy absorption	Opacity
Folding endurance	Blue reflectance (brightness)
Stiffness	Specular gloss, 75°
Air resistance	Thickness
Grammage	Concora (flat crush)
	Ring crush

FKBG-API Containerboard (48 times per year)

Mullen burst of linerboard
Concora test of medium

MCCA Color and Appearance (4 times per year)

Gloss at 60°
Color and color difference

CTS Rubber (4 times per year)

Tensile strength, ultimate elongation and tensile stress
Hardness
Mooney viscosity
Vulcanization properties

ASTM Cement (2 times per year)

Chemical (11 chemical components)
Physical (15 characteristics)

AASHTO Bituminous

Asphalt cement (2 times per year)
Cutbacks (once a year)

NBS Collaborative Reference Programs
A05 Technology Building
National Bureau of Standards
Washington, DC 20234

TECHNICAL ASSOCIATION OF THE
PULP AND PAPER INDUSTRY

COLLABORATIVE REFERENCE PROGRAM
FOR PAPER

Report No. 62S
STRENGTH TESTS

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NBSIR 80-1825

U.S. DEPARTMENT OF COMMERCE
National Bureau of Standards

INTRODUCTION

Reports 62S and 62G comprise the second set of reports for the 79-80 program year. Participants in tests which involve strength properties of paper will receive only the S report; those in tests which measure other properties will receive only the G report.

Notes and comments to individual laboratories and "Best Values" applicable to a particular method are given following Table 1 for each method. See page 1 of this report for an explanation of "Best Values". Please do not confuse these Best Values with provisional values included with the samples to detect serious discrepancies at the time of test.

If there are any questions on the notes, the analyses, or the reports in general, contact Robert G. Powell or Jeffrey Horlick on 301/921-2946.

A handwritten signature in cursive script that reads "Jeffrey Horlick". The signature is written in dark ink and is positioned above the typed name and title.

Jeffrey Horlick, Administrator
NBS-TAPPI Collaborative Reference Program
Office of Testing Laboratory Evaluation Technology

February 25, 1980

TAPPI-NBS COLLABORATIVE REFERENCE PROGRAM

BACKGROUND AND PURPOSE

In 1969, the National Bureau of Standards and the Technical Association of the Pulp and Paper Industry established a collaborative reference program to provide a participating laboratory with a means to check periodically the level and uniformity of its testing in comparison with that of other laboratories.

The interchange of paper and board products and of the raw materials for these products requires agreement among raw material suppliers, paper and board producers, converters, distributors, retailers, commercial testing laboratories, user organizations and the ultimate consumer as to the meaning of test results, an agreement that cannot be achieved without accurate and precise testing. This program is designed to help assure agreement.

HOW THE PROGRAM WORKS

Participants Select the Tests in which they wish to participate. This choice is made on joining the program, but additional tests may be added at any time. Also new participants may enter the program at any time.

Test Samples are Distributed Bimonthly; i.e. every 2 months.

Provisional Values are Provided with the Samples for one or both of the test levels, depending on method. The provisional values permit serious discrepancies to be detected without delay. (It is left to the discretion of the laboratory supervisor as to whether these values should be known to the operator.)

Each Participant Tests the Samples, following instructions provided for each test method. The full check on a single instrument should normally take no more than 30 minutes. The test results are then sent to NBS for analysis. The participant is also asked to report other information relevant to an accurate analysis, such as test conditions and the instruments used.

Industry Means, Best Values and Other Statistics are developed from the data by NBS. The best values are estimates based on a careful examination of all data, both current and past, with special attention to results obtained by the National Bureau of Standards and other recognized reference laboratories in this and other countries.

A Quick Report is Prepared for each participating laboratory reporting data on time. This report shows the industry mean values, and the deviations of the laboratory's results from these values for each test method.

A Longer Summary Report, Showing the Data from all Participants, is also prepared. In the summary report, of which this report is an example, each laboratory is identified by a code number so that the information is maintained on a confidential basis. However, instruments are identified by type so participants can compare their results with those obtained on similar instruments of different manufacture. This report includes test averages, best values and standard deviations for individual participants and for the group as a whole. A participant should be able to readily determine the level and variability of his results in comparison with those of the other laboratories.

Repeatability and Reproducibility Statements such as Contained in ASTM, TAPPI and ISO Standards are included at the end of the report. Participants can check their performance level against the precision statement given in the test method or specification.

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TABLE OF CONVERSION FACTORS TO METRIC (SI) UNITS

Physical Quantity	To Convert From	To	Multiply by
Bursting strength	psi	kPa	6.895
	kg/cm ²	kPa	98.07
	bar	kPa	100.00
Tearing strength	g	mN	9.807
Tensile strength	lb/in.	kN/m	.1751
	lb/0.5 in.	kN/m	.3502
	lb/15 mm	kN/m	.2965
	kg/15 mm	kN/m	.6538
	kg/25 mm	kN/m	.3923
	kg/mm	kN/m	9.807
	ft-lb/ft ²	J/m ²	14.59
Tensile energy absorption	in.-lb/in. ²	J/m ²	175.1
	kg-m/m ²	J/m ²	9.807
Bending stiffness	g·cm	μN·m	98.07
Flat-crush strength (Concora)	lb	N	4.448
Ring-crush (TAPPI)	lb	N	4.448
(ISO)	lb/6.00 in.	kN/m	0.0292
Thickness	mil	μm	25.40

KEY TO TABLES AND GRAPHS

MEAN - The average of individual TEST DETERMINATIONS. The number of TEST DETERMINATIONS in the mean is given in the upper right corner of the first table (TEST D₀) and again at the bottom of this table.

GRAND MEAN - (GR₀ MEAN) The average of the individual laboratory MEANS, excluding laboratories flagged (see column F) with an X, #, or *. The GRAND MEAN is given in US customary units and, where applicable, in SI metric units.

SD OF MEANS - (SD MEANS) The standard deviation of the laboratory MEANS about the GRAND MEAN; an index of the among-laboratory precision.

DEV - The deviation or difference of the laboratory MEAN from the GRAND MEAN.

N₀ DEV - The normal deviate or ratio of the DEV to the SD OF MEANS; an indication of the degree of divergence of the laboratory MEAN from the GRAND MEAN. A N₀ DEV of more than 2 or less than -2 may indicate that the participant is not following the procedure considered standard for this analysis.

SDR - The standard deviation of repeated measurements; that is, of individual test determinations about their MEAN.

AVERAGE SDR - The average of the individual laboratory SDR's; an index of the within-laboratory precision of repeated measurements.

R₀ SDR - The relative standard deviation of repeated measurements; that is, the ratio of the SDR to the AVERAGE SDR; an indication of the ability of a participant to repeat his or her measurements relative to the average ability. The greater the number of TEST DETERMINATIONS the closer the R₀ SDR should be to unity. If R₀ SDR is outside the limits given below, the participant may not be following the procedure considered standard for this analysis:

No. of test determinations	Lower limit for R ₀ SDR	Upper limit for R ₀ SDR
3	0.09	2.58
4	0.18	2.25
5	0.26	2.06
8	0.40	1.77
10	0.46	1.67
15	0.56	1.53
20	0.61	1.45
25	0.65	1.39

VAR - Code for instrument type or variation in condition, see second table.

F - Flag, with following meaning:

⊕ - Included in grand mean and inside 95% error ellipse.

* - Included in grand means but plotted point falls outside of the 95% error ellipse. The participant should take this as a warning to reexamine his or her testing procedure.

X - Excluded because plotted point would fall outside of the 95% error ellipse, (see page 2 for explanation of Graph).

- Excluded because data were not understood or because of a non-coded variation reported by the laboratory. (See the notes following Table 1 for each method).

+ - Excluded from grand means because VAR was non-standard for the analysis.

M - Excluded because data for one sample are missing.

S - Included in grand mean but only after omission of one or more "wild" values; that is test determinations more than 3 times AVERAGE SDR from the laboratory's MEAN. Not more than 20% of the test determination may be excluded in this manner without rejecting the laboratory.

Best values - Given at the end of table 1 for each method for which sufficient information is available. These best values are estimates based on a careful examination of all data, both current and past, with special attention to results obtained by the National Bureau of Standards and other recognized reference laboratories in this and other countries. All participants using equipment that is standard for the analysis should be able to achieve results within the plus-minus (+/-) limits, when these are shown along with the best values.

COORDINATES - Distances along major and minor axes of error ellipse. If special additive or current model of the measuring process applies to this method, the distance along the minor axis represents the random error within a laboratory while that along the major axis also includes a systematic laboratory component of error.

95% ELLIPSE - Lengths of the major and minor axes of the ellipse and the angle that the major axis makes with the horizontal axis.

AVG R₀ SDR - Average of the R₀ SDR for the two samples; an indication of the laboratory's precision of repeated measurements.

Graph - For each laboratory the MEAN for the second sample is plotted against the MEAN for the first sample, with each point representing a laboratory. The horizontal and vertical lines are the GRAND MEANS. The dashed line is drawn at 45 degrees. The solid sloping line, which may or may not lie close to the 45 degree line, is along the major axis of the error ellipse. The ellipse is drawn so that, on the average, it will include 95% of the points representing the laboratories.

Plotted symbols are as explained above (under F), except that an 'S' is plotted as an 'Q'. A participant whose plotted point falls outside of the ellipse should carefully reexamine the testing procedure he or she is following.

The graph is plotted with an ellipse when there are 20 or more laboratories in the analysis. When there are 10 through 19 laboratories in the analysis, the graph is plotted but the ellipse is omitted. When there are fewer than 10 laboratories retained in the analysis, the graph is not plotted.

The International System of Units (SI) is used on the plots wherever possible to aid participants in familiarizing themselves with SI. Grand means in SI units are given at the top of the plot, and supplementary scales in SI units are drawn along the axes allowing the reader to compare means and variability in common units and SI units for the same data.

SUMMARY - In addition to several quantities already defined above, the summary shows the following values for each test method:

(At end of report)

REPL CRP - The number of replicate test determinations used in this Collaborative Reference Program.

REPL TAPPI - The number of replicate test determinations in a test result required by the applicable TAPPI Official Test Method or assumed here if there is no TAPPI Official Test Method. This quantity is needed in the computation of TAPPI repeatability and reproducibility from the SD OF MEANS and the AVERAGE SDR. See TAPPI Official Test Method T1200 for definitions and computations.

REPEAT - TAPPI repeatability; a measure of the within-laboratory precision of a test result.

REPROD - TAPPI reproducibility; a measure of the between-laboratory precision of a test result.

ANALYSIS T10-1 TABLE 1
BURSTING STRENGTH, PSI
TAPPI OFFICIAL TEST METHOD T403 GS-76, PERKINS MODEL C

LAB CODE	SAMPLE	PRINTING					SAMPLE	ENVELOPE					TEST D ₀ = 15		
	K38 MEAN	75 GRAMS PER SQUARE METER DEV	N ₀ DEV	SDR	R ₀ SDR	A57 MEAN	89 GRAMS PER SQUARE METER DEV	N ₀ DEV	SDR	R ₀ SDR	VAR	F	LAB		
L121	27.07	.04	.041	1.9	.94	30.33	-1.6	.066	2.5	1.14	10C	0	L121		
L134	31.05	3.4	1.00	1.5	.73	36.5	4.6	1.91	1.9	.85	10C	0	L134		
L150	28.02	.1	.02	2.4	1.22	32.6	.7	.30	1.7	.75	10C	0	L150		
L158	29.02	1.0	.47	2.3	1.16	32.7	.9	.36	3.2	1.45	10C	0	L158		
L167	26.04	-1.3	.03	.9	.47	29.1	-2.8	-1.14	1.4	.63	10C	0	L167		
L183	27.03	.03	.039	2.0	1.03	31.3	.6	.25	1.6	.74	10C	0	L183		
L191	30.09	2.7	1.27	1.8	.89	33.6	1.8	.73	2.9	1.33	10C	0	L191		
L203A	25.05	-2.7	-1.25	2.0	.58	29.5	-2.3	.96	1.9	.88	10C	0	L203A		
L203B	31.0	2.8	1.31	3.0	1.50	36.4	4.5	1.85	3.3	1.51	10C	0	L203B		
L207	27.08	.04	.017	2.2	1.08	32.4	.5	.20	1.8	.83	10C	0	L207		
L212	29.4	1.3	.03	2.8	1.41	34.7	2.8	1.17	4.1	1.87	10C	0	L212		
L223A	31.5	3.3	1.04	2.0	.99	33.8	1.9	.78	2.4	1.10	10C	0	L223A		
L225	28.4	.2	.09	1.5	.75	33.3	1.4	.58	2.1	.95	10C	0	L225		
L232	26.2	-2.0	.94	1.7	.84	30.5	-1.4	.56	2.0	.92	10C	0	L232		
L237A	29.8	1.7	.77	1.3	.63	33.8	2.0	.81	1.6	.74	10C	0	L237A		
L237B	26.7	-1.0	.70	.8	.41	30.8	-1.1	.44	1.6	.71	10C	0	L237B		
L243	27.5	.7	.02	1.9	.96	31.4	.4	.18	3.2	1.44	10C	0	L243		
L249	25.05	-2.6	-1.23	1.7	.83	28.4	-3.4	-1.41	1.9	.86	10C	0	L249		
L261	34.4	6.3	2.01	3.3	1.67	44.7	12.9	5.30	4.7	2.14	10C	#	L261		
L264	27.1	-1.1	.02	2.2	1.08	30.1	-1.8	.74	1.8	.79	10C	0	L264		
L268	27.9	.03	.43	1.5	.74	31.5	.4	.17	2.1	.93	10C	0	L268		
L279	31.2	3.1	1.42	2.0	1.28	34.0	2.1	.88	3.2	1.43	10C	0	L279		
L301A	28.6	.5	.21	2.5	1.24	32.1	.2	.09	1.6	.73	10C	0	L301A		
L301B	28.6	.5	.21	1.6	.80	29.6	-2.3	.94	2.0	.91	10C	*	L301B		
L305	30.6	2.5	1.14	3.4	1.73	32.8	.9	.37	1.6	.74	10C	0	L305		
L312	28.5	.3	.14	1.1	.55	31.5	.4	.15	2.5	1.15	10C	0	L312		
L315	30.7	2.0	1.13	2.3	1.18	33.0	3.1	1.29	2.4	1.10	10C	0	L315		
L321	30.8	2.0	1.22	3.1	1.56	35.4	3.5	1.44	4.3	1.93	10C	0	L321		
L326	29.5	1.3	.62	2.0	.99	32.3	.4	.19	1.7	.76	10C	0	L326		
L330	27.0	-1.2	.03	1.0	.92	31.9	.0	.01	2.1	.94	10C	0	L330		
L333	28.6	.4	.20	2.1	1.04	32.0	.1	.05	2.5	1.12	10C	0	L333		
L339	22.2	-6.0	-2.70	2.4	1.21	25.2	-6.7	-2.76	2.2	1.00	10C	*	L339		
L344	30.7	2.5	1.13	3.4	1.71	34.7	2.8	1.15	2.8	1.25	10C	0	L344		
L356	25.2	-3.0	-1.40	1.0	.79	28.9	-3.0	-1.24	1.9	.85	10C	0	L356		
L358	26.6	-1.0	.70	1.3	.66	30.0	-1.9	.77	1.0	.44	10C	0	L358		
L360	28.1	.1	.03	2.3	1.15	30.6	-1.2	.51	2.0	.90	10C	0	L360		
L386	28.2	.0	.01	2.4	1.18	33.5	1.6	.65	2.3	1.02	10C	0	L386		
L390	25.6	-2.6	-1.20	2.0	1.02	28.4	-3.4	-1.42	1.3	.60	10C	0	L390		
L568	28.1	.1	.03	2.0	1.02	31.5	.1	.02	2.3	1.05	10C	0	L568		
L573	24.0	-4.2	-1.94	1.0	.48	27.7	-4.2	-1.71	.9	.41	10C	0	L573		
L582	28.6	.4	.20	2.8	1.43	32.9	1.1	.44	4.1	1.94	10C	0	L582		
L599	28.0	.2	.07	1.9	.97	31.3	.6	.23	1.9	.88	10C	0	L599		
L625	31.0	2.9	1.33	1.8	.90	34.0	2.2	.89	1.8	.82	10C	0	L625		
L684	27.0	-1.2	.03	1.0	.51	29.7	-2.2	.89	1.2	.56	10C	0	L684		
L696	30.0	1.9	.00	2.2	1.10	35.9	4.1	1.67	2.1	.94	10C	0	L696		
L736	25.0	-3.2	-1.40	1.9	.96	30.3	-1.6	.65	2.4	1.11	10C	0	L736		

GR₀ MEAN = 28.2 PSI

SD MEANS = 2.1 PSI

GRAND MEAN = 31.9 PSI

SD OF MEANS = 2.4 PSI

TEST DETERMINATIONS = 15

45 LABS IN GRAND MEANS

AVERAGE SDR = 2.0 PSI

AVERAGE SDR = 2.2 PSI

GR₀ MEAN = 194.3 KILOPASCAL

GRAND MEAN = 219.7 KILOPASCAL

L128	29.9	1.8	.62	2.1	1.05	32.7	.8	.33	2.1	.93	10B	*	L128
L155	27.4	.8	.03	1.2	.60	30.4	-1.4	.59	1.7	.77	10X	*	L155
L242	29.9	1.7	.79	2.0	.99	34.5	2.6	1.08	1.6	.70	10T	*	L242
L250L	2619.7	2591.5	1206.10	1670.6	94.30	2948.3	2916.5	1201.34	176.9	79.98	10N	*	L250L
L251	27.5	.7	.034	1.0	.79	31.2	.6	.27	1.5	.68	10V	*	L251
L260	25.7	-2.5	-1.10	1.0	.79	29.0	-2.9	-1.19	1.8	.80	10X	*	L260
L269	32.2	4.0	1.07	2.2	1.09	36.7	4.9	2.00	2.4	1.09	10A	*	L269
L702	24.3	-3.9	-1.01	2.1	1.05	26.1	-3.7	-1.54	1.6	.70	10X	*	L702
L704	27.1	-1.1	.030	1.3	.64	NO DATA REPORTED FOR SAMPLE A57					10L	*	L704
L706	27.5	.6	.030	1.4	.71	31.1	.7	.30	1.8	.82	10X	*	L706

L734 31.4 3.3 1.01 3.1 1.05 37.2 5.3 2.20 3.8 1.70 10H * L734
TOTAL NUMBER OF LABORATORIES REPORTING = 57

Best values: K38 28.3 ± 3.1 psi

A57 31.9 ± 4.0 psi

ANALYSIS T10-1 TABLE 2
BURSTING STRENGTH, PSI
TAPPI OFFICIAL TEST METHOD T403 0S-76, PERKINS MODEL C

LAB CODE	F	MEANS		COORDINATES		AVG X _{0.00K}	Y _{0.00K}	PROPERTY--TEST INSTRUMENT--CONDITIONS					
		E38	A57	ADJ _{0.00K}	MIN _{0.00K}								
L339	*	22.2	25.2	-9.0	.1	1.10	10C	BURSTING	STRENGTH	10	T6	40	PSI, PERKINS C, MANUAL CLAMP
L573	0	24.0	27.7	-3.9	.4	.45	10C	BURSTING	STRENGTH	10	T6	40	PSI, PERKINS C, MANUAL CLAMP
L702	*	24.3	28.1	-5.4	.5	.68	10X	BURSTING	STRENGTH	10	T6	40	PSI: GIVE INSTR. MAKE, MODEL, CLAMP
L736	0	25.0	30.3	-3.3	1.4	1.04	10C	BURSTING	STRENGTH	10	T6	40	PSI, PERKINS C, MANUAL CLAMP
L356	0	25.2	28.9	-4.2	.3	.62	10C	BURSTING	STRENGTH	10	T6	40	PSI, PERKINS C, MANUAL CLAMP
L203A	0	25.5	29.5	-3.5	.5	.93	10C	BURSTING	STRENGTH	10	T6	40	PSI, PERKINS C, MANUAL CLAMP
L249	0	25.5	28.4	-4.3	-.3	.64	10C	BURSTING	STRENGTH	10	T6	40	PSI, PERKINS C, MANUAL CLAMP
L390	0	25.6	28.4	-4.3	-.3	.61	10C	BURSTING	STRENGTH	10	T6	40	PSI, PERKINS C, MANUAL CLAMP
L260	*	25.7	29.0	-3.8	-.0	.79	10X	BURSTING	STRENGTH	10	T6	40	PSI: GIVE INSTR. MAKE, MODEL, CLAMP
L232	0	26.2	30.5	-2.4	.6	.66	10C	BURSTING	STRENGTH	10	T6	40	PSI, PERKINS C, MANUAL CLAMP
L167	0	26.4	29.1	-3.3	-.5	.65	10C	BURSTING	STRENGTH	10	T6	40	PSI, PERKINS C, MANUAL CLAMP
L358	0	26.6	30.0	-2.5	-.0	.65	10C	BURSTING	STRENGTH	10	T6	40	PSI, PERKINS C, MANUAL CLAMP
L237B	0	26.7	30.8	-1.8	.4	.66	10C	BURSTING	STRENGTH	10	T6	40	PSI, PERKINS C, MANUAL CLAMP
L684	0	27.0	29.7	-2.4	-.5	.63	10C	BURSTING	STRENGTH	10	T6	40	PSI, PERKINS C, MANUAL CLAMP
L330	0	27.0	31.9	-.8	.9	.63	10C	BURSTING	STRENGTH	10	T6	40	PSI, PERKINS C, MANUAL CLAMP
L264	0	27.1	30.1	-2.1	-.3	.64	10C	BURSTING	STRENGTH	10	T6	40	PSI, PERKINS C, MANUAL CLAMP
L704	*	27.1				.64	10L	BURSTING	STRENGTH	10	T6	40	PSI, PERKINS C, MANUAL CLAMP
L183	0	27.3	31.3	-1.0	.2	.63	10C	BURSTING	STRENGTH	10	T6	40	PSI, PERKINS C, MANUAL CLAMP
L155	*	27.4	30.4	-1.0	-.4	.66	10X	BURSTING	STRENGTH	10	T6	40	PSI: GIVE INSTR. MAKE, MODEL, CLAMP
L251	*	27.5	31.2	-1.0	.1	.74	10V	BURSTING	STRENGTH	10	T6	40	PSI, L*W, MANUAL CLAMP, 20C, 65% RH
L243	0	27.5	31.4	-.6	.2	1.26	10C	BURSTING	STRENGTH	10	T6	40	PSI, PERKINS C, MANUAL CLAMP
L706	*	27.5	31.1	-1.0	.0	.76	10X	BURSTING	STRENGTH	10	T6	40	PSI: GIVE INSTR. MAKE, MODEL, CLAMP
L121	0	27.7	30.3	-1.5	-.7	1.04	10C	BURSTING	STRENGTH	10	T6	40	PSI, PERKINS C, MANUAL CLAMP
L267	0	27.8	32.4	.1	.6	.66	10C	BURSTING	STRENGTH	10	T6	40	PSI, PERKINS C, MANUAL CLAMP
L268	0	27.9	31.5	-.5	-.1	.64	10C	BURSTING	STRENGTH	10	T6	40	PSI, PERKINS C, MANUAL CLAMP
L595	0	28.0	31.3	-.5	-.3	.62	10C	BURSTING	STRENGTH	10	T6	40	PSI, PERKINS C, MANUAL CLAMP
L360	0	28.1	30.6	-1.0	-.7	1.02	10C	BURSTING	STRENGTH	10	T6	40	PSI, PERKINS C, MANUAL CLAMP
L568	0	28.1	31.8	-.1	.0	1.04	10C	BURSTING	STRENGTH	10	T6	40	PSI, PERKINS C, MANUAL CLAMP
L386	0	28.2	33.5	1.2	1.0	1.10	10C	BURSTING	STRENGTH	10	T6	40	PSI, PERKINS C, MANUAL CLAMP
L150	0	28.2	32.6	.6	.4	.69	10C	BURSTING	STRENGTH	10	T6	40	PSI, PERKINS C, MANUAL CLAMP
L225	0	28.4	33.3	1.2	.8	.65	10C	BURSTING	STRENGTH	10	T6	40	PSI, PERKINS C, MANUAL CLAMP
L312	0	28.5	31.5	-.1	-.5	.65	10C	BURSTING	STRENGTH	10	T6	40	PSI, PERKINS C, MANUAL CLAMP
L582	0	28.6	32.9	1.1	.4	1.03	10C	BURSTING	STRENGTH	10	T6	40	PSI, PERKINS C, MANUAL CLAMP
L333	0	28.6	32.0	.4	-.2	1.08	10C	BURSTING	STRENGTH	10	T6	40	PSI, PERKINS C, MANUAL CLAMP
L301A	0	28.6	32.1	.5	-.2	.68	10C	BURSTING	STRENGTH	10	T6	40	PSI, PERKINS C, MANUAL CLAMP
L301B	*	28.6	29.6	-1.4	-1.8	.66	10C	BURSTING	STRENGTH	10	T6	40	PSI, PERKINS C, MANUAL CLAMP
L156	0	29.2	32.7	1.3	-.2	1.01	10C	BURSTING	STRENGTH	10	T6	40	PSI, PERKINS C, MANUAL CLAMP
L212	0	29.4	34.7	3.0	.9	1.04	10C	BURSTING	STRENGTH	10	T6	40	PSI, PERKINS C, MANUAL CLAMP
L326	0	29.5	32.3	1.2	-.7	.68	10C	BURSTING	STRENGTH	10	T6	40	PSI, PERKINS C, MANUAL CLAMP
L237A	0	29.8	33.8	2.0	.0	.69	10C	BURSTING	STRENGTH	10	T6	40	PSI, PERKINS C, MANUAL CLAMP
L242	*	29.9	34.5	3.1	.5	.64	10T	BURSTING	STRENGTH	10	T6	40	PSI, L*W, MANUAL CLAMP
L128	*	29.9	32.7	1.8	-.8	.69	10B	BURSTING	STRENGTH	10	T6	40	PSI, PERKINS B, MANUAL CLAMP
L696	0	30.0	35.9	4.3	1.3	1.02	10C	BURSTING	STRENGTH	10	T6	40	PSI, PERKINS C, MANUAL CLAMP
L305	0	30.6	32.8	2.3	-1.3	1.03	10C	BURSTING	STRENGTH	10	T6	40	PSI, PERKINS C, MANUAL CLAMP
L344	0	30.7	34.7	3.7	-.0	1.08	10C	BURSTING	STRENGTH	10	T6	40	PSI, PERKINS C, MANUAL CLAMP
L315	0	30.7	35.0	4.0	.1	1.11	10C	BURSTING	STRENGTH	10	T6	40	PSI, PERKINS C, MANUAL CLAMP
L321	0	30.8	35.4	4.4	.3	1.14	10C	BURSTING	STRENGTH	10	T6	40	PSI, PERKINS C, MANUAL CLAMP
L191	0	30.9	33.6	3.1	-.9	1.11	10C	BURSTING	STRENGTH	10	T6	40	PSI, PERKINS C, MANUAL CLAMP
L203B	0	31.0	36.4	5.2	.8	1.00	10C	BURSTING	STRENGTH	10	T6	40	PSI, PERKINS C, MANUAL CLAMP
L625	0	31.0	34.0	3.5	-.7	.66	10C	BURSTING	STRENGTH	10	T6	40	PSI, PERKINS C, MANUAL CLAMP
L279	0	31.2	34.0	3.0	-.9	1.00	10C	BURSTING	STRENGTH	10	T6	40	PSI, PERKINS C, MANUAL CLAMP
L734	*	31.4	37.2	.2	1.1	1.03	10A	BURSTING	STRENGTH	10	T6	40	PSI, PERKINS A, HYDRAULIC CLAMP
L223A	0	31.5	33.8	3.6	-1.3	1.00	10C	BURSTING	STRENGTH	10	T6	40	PSI, PERKINS C, MANUAL CLAMP
L134	0	31.5	36.5	5.7	.5	.79	10C	BURSTING	STRENGTH	10	T6	40	PSI, PERKINS C, MANUAL CLAMP
L269	*	32.2	36.7	6.3	.2	1.09	10A	BURSTING	STRENGTH	10	T6	40	PSI, PERKINS A, MANUAL CLAMP
L261	#	34.4	44.7	10.8	5.8	1.01	10C	BURSTING	STRENGTH	10	T6	40	PSI, PERKINS C, MANUAL CLAMP
L250L	*	261.5	294.8	390.4	-31.7	87.1	10N	BURSTING	STRENGTH	10	T6	40	PSI, L*W, MANUAL CLAMP, 20C, 65% RH
GMEANS:		28.2	31.9			1.00							
95% ELLIPSE:				8.1	1.8			W/IN GAMMA = 48 DEGREES					

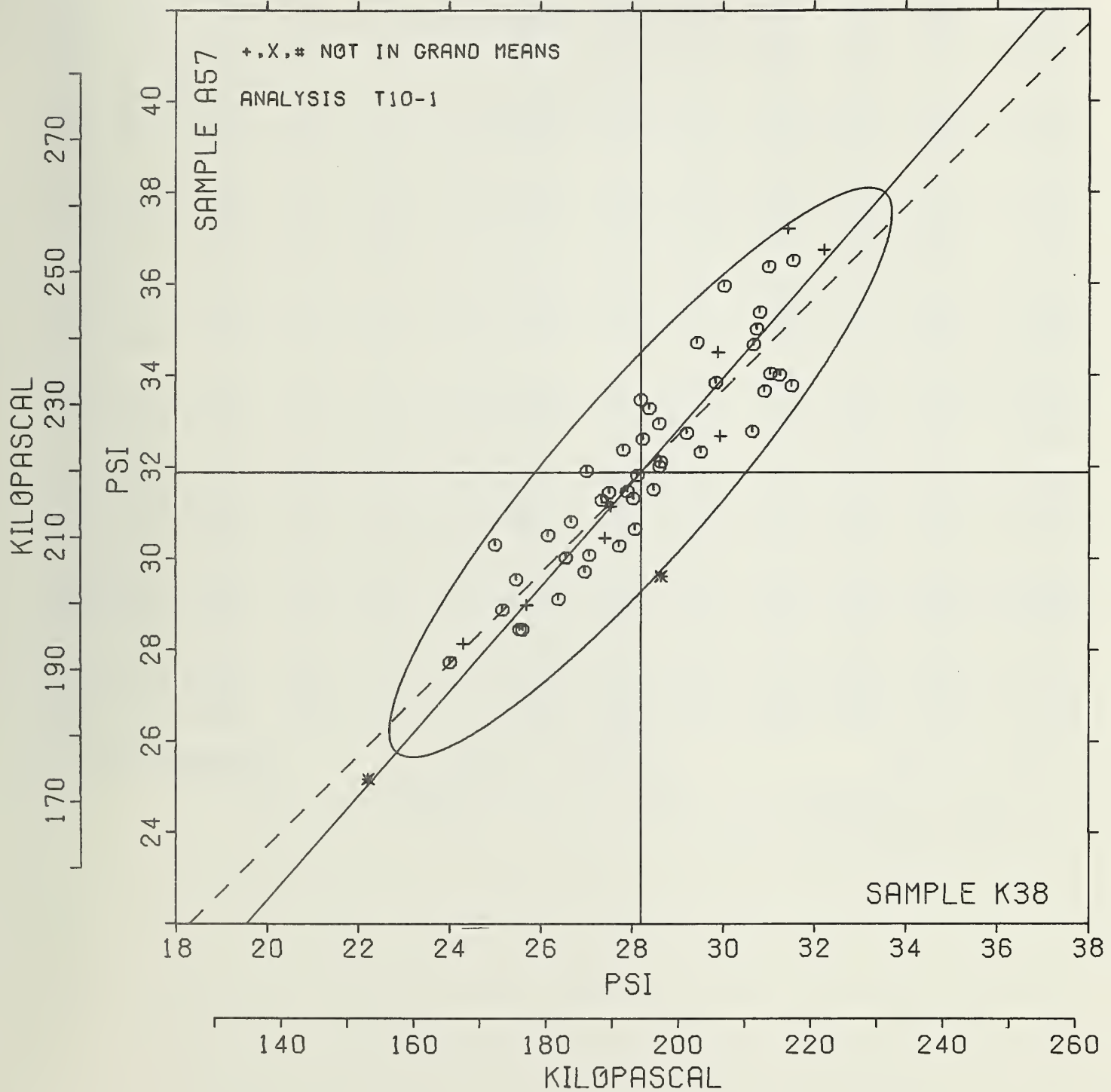
BURSTING STRENGTH, MODEL C

SAMPLE K38 = 28.2 PSI

SAMPLE A57 = 31.9 PSI

SAMPLE K38 = 194 KILOPASCAL

SAMPLE A57 = 220 KILOPASCAL



ANALYSIS T10-2 TABLE 1

BURSTING STRENGTH, PSI

TAPPI OFFICIAL TEST METHOD T403 OS-76, PERKINS MODEL C-A OR C WITH AIR OR HYDRAULIC CLAMPS

LAB CODE	SAMPLE K38		PAINTING 75 GRAMS PER SQUARE METER				SAMPLE A57		ENVELOPE 89 GRAMS PER SQUARE METER				TEST D ₀ = 15		
	MEAN	DEV	N ₀ DEV	SDR	N ₀ SDR		MEAN	DEV	N ₀ DEV	SDR	R ₀ SDR		VAR	F	LAB
L105	25.3	-2.3	-1.000	1.4	.84		28.3	-2.7	-1.15	1.9	1.03		10D	Ø	L105
L106C	29.9	2.3	1.001	1.1	.85		33.3	2.4	1.01	1.3	.70		10D	Ø	L106C
L115	30.4	2.8	1.023	1.7	.98		35.2	2.3	.97	1.9	1.03		10D	Ø	L115
L118	28.9	1.3	.99	2.1	1.23		32.2	1.3	.54	1.4	.79		10D	Ø	L118
L122	26.3	-1.2	-0.93	2.1	1.25		30.0	-0.9	-0.39	1.8	.96		10F	Ø	L122
L125	27.1	-.4	-0.10	1.8	1.05		30.5	-.4	-.17	1.3	.69		10D	Ø	L125
L141	27.9	.4	.10	2.1	1.20		31.6	.7	.28	1.9	1.02		10D	Ø	L141
L148	28.9	1.4	.90	1.8	1.07		32.2	1.3	.54	2.3	1.27		10D	Ø	L148
L157	30.6	3.0	1.033	1.3	.77		33.9	3.0	1.27	1.7	.95		10D	Ø	L157
L159	24.5	-3.0	-1.033	2.0	1.20		27.1	-3.8	-1.64	1.8	1.00		10D	Ø	L159
L162	20.9	-6.7	-2.042	1.5	.88		24.9	-6.0	-2.58	2.1	1.13		10D	*	L162
L163	27.5	-.1	-0.03	1.0	.94		31.3	.3	.14	1.1	.62		10D	Ø	L163
L166	31.4	3.9	1.009	1.2	.72		34.7	3.7	1.60	2.0	1.10		10D	Ø	L166
L176	23.7	-3.9	-1.070	1.0	.95		28.3	-2.6	-1.12	2.0	1.06		10D	Ø	L176
L185	28.9	1.3	.97	1.5	.85		31.6	.7	.28	1.4	.73		10D	Ø	L185
L190C	28.2	.6	.28	1.0	.91		31.8	.9	.38	1.9	1.04		10D	Ø	L190C
L194	26.6	-1.0	-0.43	1.1	.65		29.9	-1.1	-0.46	1.6	.85		10D	Ø	L194
L217	27.6	.0	.02	1.4	.82		29.6	-1.3	-.58	2.7	1.45		10F	Ø	L217
L224	28.6	1.1	.47	1.9	1.13		33.6	2.7	1.15	2.0	1.06		10D	Ø	L224
L226B	27.4	-.1	-0.05	1.3	.75		32.3	1.3	.56	2.1	1.12		10D	Ø	L226B
L226C	27.7	.1	.00	1.9	1.12		30.5	-.5	-.20	1.4	.75		10D	Ø	L226C
L233	28.7	1.1	.90	1.2	.71		31.2	.3	.12	1.7	.91		10D	Ø	L233
L241	29.5	1.9	.93	2.8	1.61		32.5	1.5	.65	2.6	1.41		10D	Ø	L241
L248	28.3	.8	.33	2.0	1.17		30.2	-.7	-.31	1.9	1.01		10K	Ø	L248
L255	25.7	-1.3	-0.90	1.3	.70		28.2	-2.8	-1.19	1.8	.97		10D	Ø	L255
L262	27.5	-.9	-0.01	.8	.49		31.8	.9	.37	2.0	1.06		10D	Ø	L262
L275	26.9	-.7	-0.30	2.0	1.15		30.0	-1.0	-.42	2.1	1.12		10D	Ø	L275
L280	29.6	2.1	.34	1.8	1.07		33.4	2.4	1.04	1.7	.90		10D	Ø	L280
L285	29.9	2.4	1.044	2.7	1.58		35.5	4.6	1.97	3.7	2.02		10D	*	L285
L309	27.4	-.2	-0.09	2.2	1.28		32.5	1.5	.66	1.7	.94		10D	Ø	L309
L313	24.3	-3.3	-1.44	2.2	1.28		27.6	-3.4	-1.44	2.2	1.17		10I	Ø	L313
L341	27.4	-.2	-0.00	1.2	.67		31.6	.7	.30	1.3	.69		10D	Ø	L341
L352	25.4	-2.2	-.90	1.4	.79		29.3	-1.6	-.70	1.3	.71		10D	Ø	L352
L563	23.1	-4.5	-1.300	1.5	.89		27.6	-4.0	-1.070	1.9	1.04		10U	Ø	L563
L575	20.5	-1.1	-.40	1.0	.94		28.7	-2.2	-.95	1.7	.94		10D	Ø	L575
L581	28.8	1.2	.93	1.5	.87		31.5	.6	.25	2.3	1.23		10D	Ø	L581
L587	30.2	2.6	1.10	1.8	1.05		32.3	1.4	.58	2.1	1.12		10D	Ø	L587
L652	25.1	-2.4	-1.00	2.9	1.66		28.1	-2.8	-1.22	3.2	1.75		10D	Ø	L652
L680	29.1	1.5	.60	1.8	1.03		31.6	.7	.30	1.7	.92		10D	Ø	L680
L698	30.6	3.1	1.034	2.5	1.47		33.5	3.0	1.26	1.7	.90		10D	Ø	L698

GR_c MEAN = 27.6 PSI

SD MEANS = 2.3 PSI

GRAND MEAN = 30.9 PSI

SD OF MEANS = 2.3 PSI

TEST DETERMINATIONS = 15

40 LABS IN GRAND MEANS

AVERAGE SDR = 1.7 PSI

AVERAGE SDR = 1.8 PSI

GR₀ MEAN = 150.0 KILOPASCAL

GRAND MEAN = 213.3 KILOPASCAL

TOTAL NUMBER OF LABORATORIES REPORTING = 40

Best values: K38 27.7 + 3.4 psi

A57 31.0 ± 3.7 psi

ANALYSIS T10-2 TABLE 2

BURSTING STRENGTH, PSI

TAPPI OFFICIAL TEST METHOD T403 6S-70, PERKINS MODEL C-A OR C WITH AIR OR HYDRAULIC CLAMPS

LAB CODE	F	MEANS		COORDINATES		AVG		PROPERTY---	TEST	INSTRUMENT---	CONDITIONS
		E38	A57	MAJOR	MINOR	E ₃₈	V _{AK}				
L162	*	26.9	24.9	-9.0	.6	1.00	10D	BURSTING	STRENGTH	10 T6 40 PSI,	PERKINS CA 6R C, AIR CLAMP
L563	Ø	23.1	27.0	-6.0	.4	.97	10U	BURSTING	STRENGTH	10 T6 40 PSI,	PERKINS CA 6R C, AIR CLAMP
L176	Ø	23.7	28.3	-4.6	1.0	1.01	10D	BURSTING	STRENGTH	10 T6 40 PSI,	PERKINS CA 6R C, AIR CLAMP
L313	Ø	24.3	27.6	-4.7	.0	1.02	10I	BURSTING	STRENGTH	10 T6 40 PSI,	PERKINS CA 6R C, AIR CLAMP
L159	Ø	24.5	27.1	-4.9	-.5	1.10	10D	BURSTING	STRENGTH	10 T6 40 PSI,	PERKINS CA 6R C, AIR CLAMP
L652	Ø	25.1	28.1	-3.7	-.3	1.07	10D	BURSTING	STRENGTH	10 T6 40 PSI,	PERKINS CA 6R C, AIR CLAMP
L105	Ø	25.3	28.3	-3.3	-.2	.94	10D	BURSTING	STRENGTH	10 T6 40 PSI,	PERKINS CA 6R C, AIR CLAMP
L352	Ø	25.4	29.3	-2.7	.4	.75	10D	BURSTING	STRENGTH	10 T6 40 PSI,	PERKINS CA 6R C, AIR CLAMP
L255	Ø	25.7	28.2	-3.3	-.6	.67	10D	BURSTING	STRENGTH	10 T6 40 PSI,	PERKINS CA 6R C, AIR CLAMP
L122	Ø	26.3	30.0	-1.3	.2	1.11	10F	BURSTING	STRENGTH	10 T6 40 PSI,	PERKINS C, H ₂ O CLAMP, TRANSDUCER
L575	Ø	26.5	28.7	-2.3	-.8	.94	10D	BURSTING	STRENGTH	10 T6 40 PSI,	PERKINS CA 6R C, AIR CLAMP
L194	Ø	26.6	29.9	-1.3	-.0	.75	10D	BURSTING	STRENGTH	10 T6 40 PSI,	PERKINS CA 6R C, AIR CLAMP
L275	Ø	26.9	30.0	-1.2	-.2	1.13	10D	BURSTING	STRENGTH	10 T6 40 PSI,	PERKINS CA 6R C, AIR CLAMP
L125	Ø	27.1	30.5	-.6	.0	.67	10D	BURSTING	STRENGTH	10 T6 40 PSI,	PERKINS CA 6R C, AIR CLAMP
L309	Ø	27.4	32.5	1.0	1.2	1.11	10D	BURSTING	STRENGTH	10 T6 40 PSI,	PERKINS CA 6R C, AIR CLAMP
L341	Ø	27.4	31.6	.4	.0	.63	10D	BURSTING	STRENGTH	10 T6 40 PSI,	PERKINS CA 6R C, AIR CLAMP
L226B	Ø	27.4	32.3	.9	1.0	.93	10D	BURSTING	STRENGTH	10 T6 40 PSI,	PERKINS CA 6R C, AIR CLAMP
L163	Ø	27.5	31.3	.2	.3	.78	10D	BURSTING	STRENGTH	10 T6 40 PSI,	PERKINS CA 6R C, AIR CLAMP
L262	Ø	27.5	31.8	.6	.6	.77	10D	BURSTING	STRENGTH	10 T6 40 PSI,	PERKINS CA 6R C, AIR CLAMP
L217	Ø	27.6	29.6	-.9	-1.0	1.13	10F	BURSTING	STRENGTH	10 T6 40 PSI,	PERKINS C, H ₂ O CLAMP, TRANSDUCER
L226C	Ø	27.7	30.5	-.2	-.4	.94	10D	BURSTING	STRENGTH	10 T6 40 PSI,	PERKINS CA 6R C, AIR CLAMP
L141	Ø	27.9	31.6	.7	.2	1.11	10D	BURSTING	STRENGTH	10 T6 40 PSI,	PERKINS CA 6R C, AIR CLAMP
L190C	Ø	28.2	31.8	1.1	.2	.98	10D	BURSTING	STRENGTH	10 T6 40 PSI,	PERKINS CA 6R C, AIR CLAMP
L248	Ø	28.3	30.2	.0	-1.1	1.09	10K	BURSTING	STRENGTH	10 T6 40 PSI,	PERKINS C, H ₂ O CLAMP, TRANSDUCER
L224	Ø	28.6	33.6	2.7	1.1	1.09	10D	BURSTING	STRENGTH	10 T6 40 PSI,	PERKINS CA 6R C, AIR CLAMP
L233	Ø	28.7	31.2	1.0	-.6	.61	10D	BURSTING	STRENGTH	10 T6 40 PSI,	PERKINS CA 6R C, AIR CLAMP
L581	Ø	28.8	31.5	1.3	-.5	1.03	10D	BURSTING	STRENGTH	10 T6 40 PSI,	PERKINS CA 6R C, AIR CLAMP
L185	Ø	28.9	31.6	1.4	-.5	.79	10D	BURSTING	STRENGTH	10 T6 40 PSI,	PERKINS CA 6R C, AIR CLAMP
L118	Ø	28.9	32.2	1.8	-.1	1.01	10D	BURSTING	STRENGTH	10 T6 40 PSI,	PERKINS CA 6R C, AIR CLAMP
L148	Ø	28.9	32.2	1.9	-.1	1.17	10D	BURSTING	STRENGTH	10 T6 40 PSI,	PERKINS CA 6R C, AIR CLAMP
L680	Ø	29.1	31.6	1.5	-.6	.98	10D	BURSTING	STRENGTH	10 T6 40 PSI,	PERKINS CA 6R C, AIR CLAMP
L241	Ø	29.5	32.5	2.4	-.3	1.01	10D	BURSTING	STRENGTH	10 T6 40 PSI,	PERKINS CA 6R C, AIR CLAMP
L280	Ø	29.6	33.4	3.2	.2	.98	10D	BURSTING	STRENGTH	10 T6 40 PSI,	PERKINS CA 6R C, AIR CLAMP
L106C	Ø	29.9	33.3	3.3	-.0	.67	10D	BURSTING	STRENGTH	10 T6 40 PSI,	PERKINS CA 6R C, AIR CLAMP
L285	*	29.9	35.5	4.9	1.5	1.00	10D	BURSTING	STRENGTH	10 T6 40 PSI,	PERKINS CA 6R C, AIR CLAMP
L587	Ø	30.2	32.3	2.8	-.9	1.08	10D	BURSTING	STRENGTH	10 T6 40 PSI,	PERKINS CA 6R C, AIR CLAMP
L115	Ø	30.4	33.2	3.6	-.4	1.01	10D	BURSTING	STRENGTH	10 T6 40 PSI,	PERKINS CA 6R C, AIR CLAMP
L157	Ø	30.6	33.9	4.2	-.1	.66	10D	BURSTING	STRENGTH	10 T6 40 PSI,	PERKINS CA 6R C, AIR CLAMP
L698	Ø	30.6	33.9	4.3	-.1	1.18	10D	BURSTING	STRENGTH	10 T6 40 PSI,	PERKINS CA 6R C, AIR CLAMP
L166	Ø	31.4	34.7	5.4	-.2	.61	10D	BURSTING	STRENGTH	10 T6 40 PSI,	PERKINS CA 6R C, AIR CLAMP
GMEANS:		27.6	30.9			1.00					
95% ELLIPSE:				8.3	1.6						WILD GAMMA = 45 DEGREES

ANALYSIS T11-1 TABLE 1
 BURSTING STRENGTH, PSI - HIGH RANGE
 TAPPI OFFICIAL TEST METHOD T403 08-76, PERKINS MODEL C OR C-A

LAB CODE	SAMPLE B63					SAMPLE Z15					TUBE WINDING					TEST D ₀ = 15		
	MEAN	DEV	NO. DEV	SDR	R ₀ SDR	MEAN	DEV	NO. DEV	SDR	R ₀ SDR	VAR	F	LAB					
L103	61.6	0.4	0.14	2.03	0.74	74.7	1.0	0.31	3.6	0.67	11C	0	L103					
L107	64.4	2.4	0.1	4.0	1.22	70.2	5.5	1.72	4.3	0.81	11C	X	L107					
L118	64.8	2.8	0.72	4.1	1.09	77.2	1.5	0.47	5.0	0.94	11D	0	L118					
L128	61.1	0.9	0.22	3.1	0.83	75.3	0.4	0.13	4.4	0.82	11D	0	L128					
L141	66.6	4.6	1.15	4.9	1.30	79.3	3.6	1.13	6.0	1.12	11D	0	L141					
L148	62.7	0.7	0.17	4.2	1.12	74.5	0.9	0.27	5.0	0.94	11D	0	L148					
L159	56.3	5.7	1.44	2.0	0.8	71.2	4.5	1.41	4.4	0.83	11D	0	L159					
L170	62.9	0.9	0.23	5.5	1.47	75.2	0.5	0.16	4.8	0.90	11C	0	L170					
L176	58.1	3.9	0.97	2.9	0.70	75.5	0.2	0.06	4.8	0.90	11D	0	L176					
L182	63.7	1.7	0.44	3.0	0.96	74.9	0.7	0.23	4.6	0.86	11D	0	L182					
L218	62.8	0.8	0.20	3.3	0.87	77.3	1.6	0.50	6.4	1.19	11D	0	L218					
L232	53.2	3.8	0.90	8.4	2.22	74.4	1.2	0.39	6.8	1.28	11C	0	L232					
L237A	72.1	10.1	2.00	3.3	0.88	79.1	3.5	1.09	4.4	0.82	11C	*	L237A					
L237B	60.2	1.8	0.40	1.5	0.40	76.9	1.2	0.38	4.0	0.75	11C	0	L237B					
L238A	72.3	10.3	2.09	0.5	1.74	63.7	8.0	2.51	6.5	1.22	11Y	*	L238A					
L243	59.9	2.1	0.55	3.0	0.97	72.8	2.8	0.89	5.0	0.93	11C	0	L243					
L248	61.6	0.4	0.10	4.7	1.26	76.0	0.4	0.11	6.2	1.17	11K	0	L248					
L278	58.1	3.9	0.98	4.7	1.24	75.5	0.2	0.05	6.3	1.17	11C	0	L278					
L279	71.1	9.1	2.29	4.2	1.13	93.2	17.5	5.51	11.6	2.17	11C	#	L279					
L280	62.8	0.8	0.19	3.1	0.82	75.4	0.2	0.07	6.9	1.30	11D	0	L280					
L303	55.7	6.3	1.00	2.1	0.57	66.4	7.3	2.30	3.5	0.66	11C	0	L303					
L311	64.2	2.2	0.55	3.8	1.02	77.6	2.0	0.62	5.0	0.94	11C	0	L311					
L330	62.4	0.4	0.11	5.1	1.30	75.8	0.1	0.04	5.6	1.05	11C	0	L330					
L333	61.0	1.0	0.25	3.9	1.03	75.4	2.3	0.71	7.0	1.30	11C	0	L333					
L334	65.8	3.8	0.90	3.0	0.74	77.5	1.8	0.57	5.1	0.95	11D	0	L334					
L339	56.9	5.1	1.27	2.5	0.60	68.7	7.0	2.20	5.2	0.98	11C	0	L339					
L344	68.1	6.1	1.05	6.1	1.01	79.5	4.3	1.34	5.0	0.94	11C	0	L344					
L348	60.8	1.2	0.31	3.8	1.01	75.1	0.5	0.17	7.6	1.42	11C	0	L348					
L356	62.6	0.6	0.15	3.8	0.92	81.2	5.5	1.74	7.8	1.45	11C	*	L356					
L563	59.1	2.9	0.74	4.1	1.08	71.2	4.4	1.39	6.3	1.18	11Y	0	L563					
L565	60.8	1.2	0.29	1.9	0.51	74.7	0.9	0.29	2.3	0.43	11D	0	L565					
L575	55.2	6.8	1.71	3.5	0.92	71.4	4.2	1.33	4.9	0.92	11D	0	L575					
L576	63.0	1.0	0.20	2.0	0.60	75.2	0.5	0.16	5.5	1.02	11P	0	L576					
L581	62.1	0.1	0.02	4.2	1.12	74.8	0.9	0.27	4.5	0.84	11D	0	L581					
L599	64.3	2.3	0.50	5.2	1.38	76.9	1.2	0.38	5.5	1.04	11C	0	L599					
L604	59.3	2.7	0.89	2.5	0.66	75.5	0.2	0.06	6.3	1.17	11C	0	L604					
L622	61.9	0.1	0.05	4.9	1.30	76.8	1.1	0.36	7.8	1.46	11E	0	L622					
L650	61.1	0.9	0.22	4.1	1.09	76.6	0.9	0.29	4.0	0.76	11D	0	L650					
L651	69.2	7.2	1.02	4.0	1.07	80.1	4.4	1.38	8.2	1.53	11F	0	L651					
L680	60.9	1.1	0.28	2.9	0.76	78.5	2.8	0.88	3.1	0.57	11D	0	L680					
L730	57.5	4.5	1.12	2.5	0.60	70.9	4.8	1.51	5.8	1.09	11D	0	L730					
GR ₀ MEAN = 62.0 PSI																		

TOTAL NUMBER OF LABORATORIES REPORTING = 54

Best values: B63 62 ± 7 psi
 Z15 75 ± 6 psi

The following laboratories were omitted from the grand means because of extreme test results: 279.

ANALYSIS T11-1 TABLE 2

BURSTING STRENGTH, PSI - HIGH RANGE

TAPPI OFFICIAL TEST METHOD T403 65-76, PERKINS MODEL C OR C-A

LAB CODE	F	MEANS		COORDINATES		AVG		PROPERTY---TEST INSTRUMENT---CONDITIONS									
		E63	Z15	MAJOR	MINOR	ES	VAR										
L738	+	51.3	66.7	-13.9	-0.7	1.59	11X	BURSTING	STRENGTH	40	T6	85	PSI, :	GIVE INSTRUMENT MAKE, MODEL			
L736	+	52.0	64.5	-14.7	-2.8	0.99	11A	BURSTING	STRENGTH	40	T6	85	PSI,	PERKINS A, MANUAL CLAMP			
L575	0	55.2	71.4	-8.0	0.8	0.92	11D	BURSTING	STRENGTH	40	T6	85	PSI,	PERKINS CA, AIR CLAMP			
L303	0	55.7	68.4	-9.4	-2.0	0.61	11C	BURSTING	STRENGTH	40	T6	85	PSI,	PERKINS C, MANUAL CLAMP			
L159	0	56.3	71.2	-7.3	-0.1	0.76	11D	BURSTING	STRENGTH	40	T6	85	PSI,	PERKINS CA, AIR CLAMP			
L339	0	56.9	68.7	-8.3	-2.5	0.82	11C	BURSTING	STRENGTH	40	T6	85	PSI,	PERKINS C, MANUAL CLAMP			
L730	0	57.5	70.9	-8.3	-1.1	0.88	11D	BURSTING	STRENGTH	40	T6	85	PSI,	PERKINS CA, AIR CLAMP			
L278	0	58.1	75.5	-3.2	2.2	1.02	11C	BURSTING	STRENGTH	40	T6	85	PSI,	PERKINS C, MANUAL CLAMP			
L176	0	58.1	75.5	-3.2	2.2	0.63	11D	BURSTING	STRENGTH	40	T6	85	PSI,	PERKINS CA, AIR CLAMP			
L232	0	58.2	74.4	-3.8	1.3	1.075	11C	BURSTING	STRENGTH	40	T6	85	PSI,	PERKINS C, MANUAL CLAMP			
L563	0	59.1	71.2	-5.0	-1.7	1.13	11Y	BURSTING	STRENGTH	40	T6	85	PSI,	PERKINS CA, AIR CLAMP			
L604	0	59.3	75.5	-2.3	1.5	0.91	11C	BURSTING	STRENGTH	40	T6	85	PSI,	PERKINS C, MANUAL CLAMP			
L243	0	59.9	72.8	-3.4	-1.0	0.95	11C	BURSTING	STRENGTH	40	T6	85	PSI,	PERKINS C, MANUAL CLAMP			
L237B	0	60.2	76.9	-0.7	2.0	0.58	11C	BURSTING	STRENGTH	40	T6	85	PSI,	PERKINS C, MANUAL CLAMP			
L570	+	60.5	76.3	-0.7	1.4	0.63	11H	BURSTING	STRENGTH	40	T6	85	PSI,	PERKINS AH, HYDRAULIC CLAMP			
L348	0	60.8	75.1	-1.3	0.3	1.21	11C	BURSTING	STRENGTH	40	T6	85	PSI,	PERKINS C, MANUAL CLAMP			
L565	0	60.8	74.7	-1.5	-0.9	0.47	11D	BURSTING	STRENGTH	40	T6	85	PSI,	PERKINS CA, AIR CLAMP			
L680	0	60.9	78.5	0.8	2.9	0.67	11D	BURSTING	STRENGTH	40	T6	85	PSI,	PERKINS CA, AIR CLAMP			
L333	0	61.0	73.4	-2.2	-1.2	1.16	11C	BURSTING	STRENGTH	40	T6	85	PSI,	PERKINS C, MANUAL CLAMP			
L650	0	61.1	76.6	-0.1	1.3	0.53	11D	BURSTING	STRENGTH	40	T6	85	PSI,	PERKINS CA, AIR CLAMP			
L128	0	61.1	75.3	-0.9	0.2	0.62	11D	BURSTING	STRENGTH	40	T6	85	PSI,	PERKINS CA, AIR CLAMP			
L103	0	61.6	74.7	-0.9	-0.5	0.71	11C	BURSTING	STRENGTH	40	T6	85	PSI,	PERKINS C, MANUAL CLAMP			
L248	0	61.6	76.0	-0.1	0.5	1.21	11A	BURSTING	STRENGTH	40	T6	85	PSI,	PERKINS C, H ₂ O CLAMP, TRANSDUCER			
L622	0	61.9	76.8	0.0	1.0	1.38	11E	BURSTING	STRENGTH	40	T6	85	PSI,	PERKINS C, MANUAL CLAMP			
L581	0	62.1	74.8	-0.5	-0.7	0.98	11D	BURSTING	STRENGTH	40	T6	85	PSI,	PERKINS CA, AIR CLAMP			
L330	0	62.4	75.8	0.4	-0.1	1.21	11C	BURSTING	STRENGTH	40	T6	85	PSI,	PERKINS C, MANUAL CLAMP			
L356	+	62.6	81.2	3.8	4.1	1.19	11C	BURSTING	STRENGTH	40	T6	85	PSI,	PERKINS C, MANUAL CLAMP			
L148	0	62.7	76.5	1.1	0.3	1.03	11D	BURSTING	STRENGTH	40	T6	85	PSI,	PERKINS CA, AIR CLAMP			
L280	0	62.8	75.4	0.5	-0.7	1.06	11D	BURSTING	STRENGTH	40	T6	85	PSI,	PERKINS CA, AIR CLAMP			
L218	0	62.8	77.3	1.0	0.8	1.03	11D	BURSTING	STRENGTH	40	T6	85	PSI,	PERKINS CA, AIR CLAMP			
L170	0	62.9	75.2	0.4	-0.9	1.19	11C	BURSTING	STRENGTH	40	T6	85	PSI,	PERKINS C, MANUAL CLAMP			
L576	0	63.0	75.2	0.5	-1.0	0.64	11F	BURSTING	STRENGTH	40	T6	85	PSI,	PERKINS LC, MANUAL CLAMP			
L182	0	63.7	74.9	0.9	-1.6	0.91	11D	BURSTING	STRENGTH	40	T6	85	PSI,	PERKINS CA, AIR CLAMP			
L393	+	63.9	76.3	1.9	-0.7	0.78	11H	BURSTING	STRENGTH	40	T6	85	PSI,	PERKINS AH, HYDRAULIC CLAMP			
L311	0	64.2	77.6	2.9	0.2	0.98	11C	BURSTING	STRENGTH	40	T6	85	PSI,	PERKINS C, MANUAL CLAMP			
L242	+	64.2	79.5	4.0	1.7	1.13	11T	BURSTING	STRENGTH	40	T6	85	PSI,	L*W, MANUAL CLAMP			
L599	0	64.3	76.9	2.6	-0.5	1.21	11C	BURSTING	STRENGTH	40	T6	85	PSI,	PERKINS C, MANUAL CLAMP			
L107	X	64.4	70.2	-1.4	-3.8	1.02	11C	BURSTING	STRENGTH	40	T6	85	PSI,	PERKINS C, MANUAL CLAMP			
L118	0	64.8	77.2	3.2	-0.5	1.01	11D	BURSTING	STRENGTH	40	T6	85	PSI,	PERKINS CA, AIR CLAMP			
L598	+	65.1	86.1	8.8	0.4	1.40	11D	BURSTING	STRENGTH	40	T6	85	PSI,	MESSMER, MANUAL CLAMP			
L394	+	65.7	78.0	4.4	-0.4	0.55	11H	BURSTING	STRENGTH	40	T6	85	PSI,	PERKINS AH, HYDRAULIC CLAMP			
L334	0	65.8	77.5	4.1	-0.9	0.67	11D	BURSTING	STRENGTH	40	T6	85	PSI,	PERKINS CA, AIR CLAMP			
L141	0	66.6	79.3	5.8	0.1	1.21	11D	BURSTING	STRENGTH	40	T6	85	PSI,	PERKINS CA, AIR CLAMP			
L290	+	66.6	81.1	6.9	1.5	0.66	11A	BURSTING	STRENGTH	40	T6	85	PSI,	PERKINS A, MANUAL CLAMP			
L251	+	66.6	82.5	7.8	2.6	1.02	11V	BURSTING	STRENGTH	40	T6	85	PSI,	L*W, MANUAL CLAMP, 20C, 65% RH			
L625	+	67.5	79.9	6.9	0.0	0.91	11A	BURSTING	STRENGTH	40	T6	85	PSI,	PERKINS A, MANUAL CLAMP			
L344	0	68.1	79.9	7.5	-0.3	1.28	11C	BURSTING	STRENGTH	40	T6	85	PSI,	PERKINS C, MANUAL CLAMP			
L651	0	69.2	80.1	8.4	-0.9	1.30	11F	BURSTING	STRENGTH	40	T6	85	PSI,	PERKINS C, H ₂ O CLAMP, TRANSDUCER			
L277	+	69.7	84.9	11.8	2.7	1.23	11H	BURSTING	STRENGTH	40	T6	85	PSI,	PERKINS AH, HYDRAULIC CLAMP			
L739	#	71.1	93.2	17.9	8.4	1.05	11C	BURSTING	STRENGTH	40	T6	85	PSI,	PERKINS C, MANUAL CLAMP			
L237A	+	72.1	79.1	10.2	-3.4	0.65	11C	BURSTING	STRENGTH	40	T6	85	PSI,	PERKINS C, MANUAL CLAMP			
L238A	+	72.3	83.7	13.0	0.1	1.48	11Y	BURSTING	STRENGTH	40	T6	85	PSI,	PERKINS CA, AIR CLAMP			
L593	+	73.7	90.5	18.3	4.6	1.47	11J	BURSTING	STRENGTH	40	T6	85	PSI,	PERKINS JUMHO, HAND DRIVEN			
L250L	+	5722.7	6747.3	8500.5	1005.7	1030.1	11N	BURSTING	STRENGTH	40	T6	85	PSI,	LHOMARGY, MAN. CLAMP, 20C, 65% RH			
GMEANS:		62.0	75.7			1.00											
		95% ELLIPSE:		12.0	3.8												

WITH GAMMA = 37 DEGREES

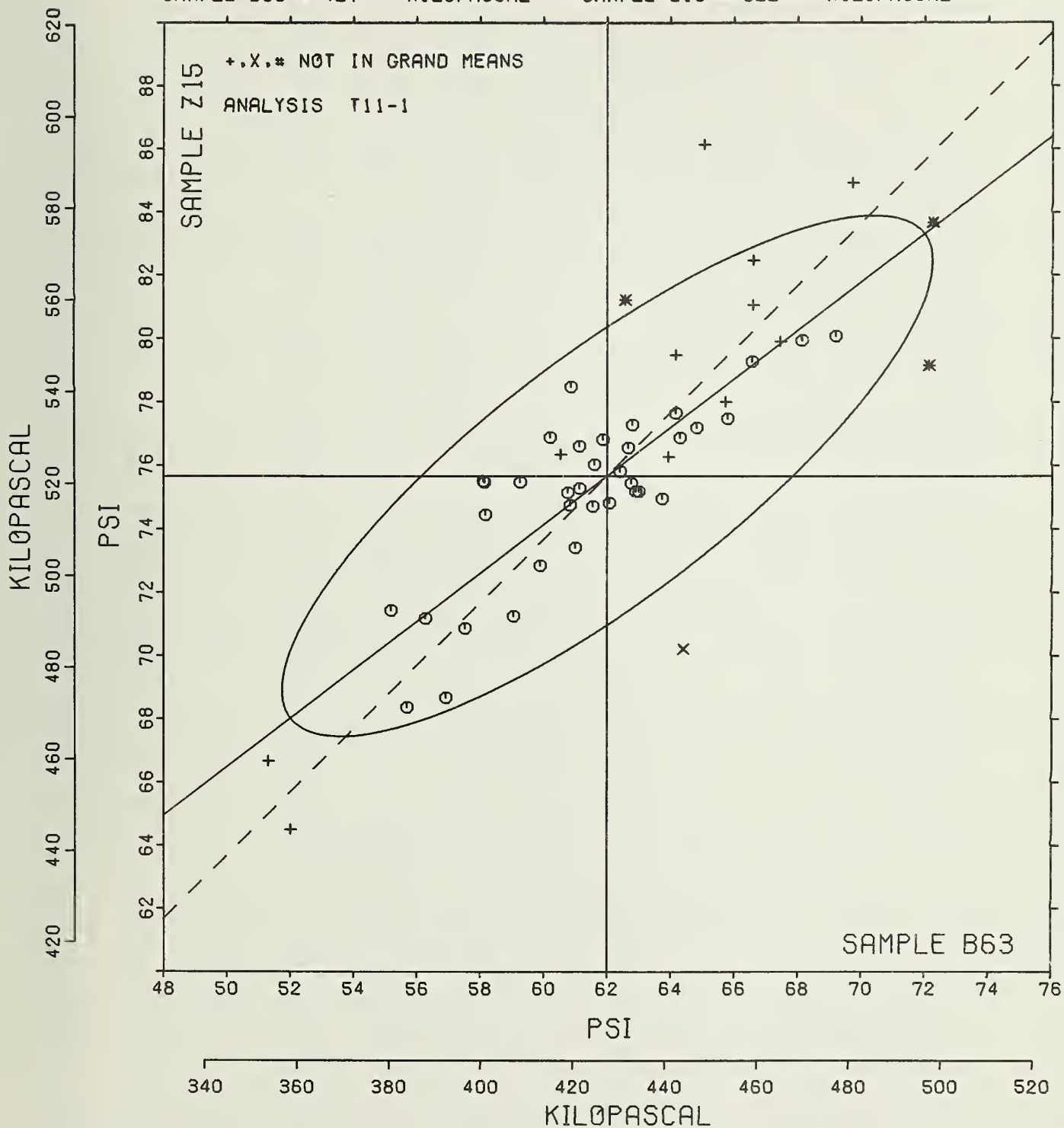
BURSTING STRENGTH, HIGH RANGE

SAMPLE B63 = 62. PSI

SAMPLE Z15 = 76. PSI

SAMPLE B63 = 427 KILOPASCAL

SAMPLE Z15 = 522 KILOPASCAL



ANALYSIS T15-1 TABLE 1
 TEARING STRENGTH, GRAMS - PRIMARILY PRINTING PAPERS
 TAPPI TENTATIVE TEST METHOD T414 TS-65, INTERNAL TEARING RESISTANCE OF PAPER

LAB CODE	BOND					HEAT-SET OFFSET BOOK					TEST D ₀ = 15		
	SAMPLE E85 MEAN	79 GRAMS PER DEV	SQUARE METER N ₀ DEV	SDR	R ₀ SDR	SAMPLE G15 MEAN	93 GRAMS PER DEV	SQUARE METER N ₀ DEV	SDR	R ₀ SDR	VAR	F	LAB
L103	37.73	-1.62	-0.73	0.59	0.49	50.40	-1.26	-0.53	1.40	0.90	15T	0	L103
L105	37.87	-1.48	-0.69	1.077	1.45	49.47	-2.19	-0.93	1.41	0.90	15T	0	L105
L107	40.00	0.65	0.30	10.69	8.80	36.00	-15.66	-6.63	5.07	3.25	15T	#	L107
L115	40.67	1.32	0.01	2.19	1.81	49.60	-2.06	-0.87	1.68	1.08	15C	0	L115
L118	37.80	-1.55	-0.72	1.21	0.99	49.73	-1.93	-0.82	1.58	1.01	15T	0	L118
L121	40.00	0.65	0.30	1.40	1.20	50.47	-1.19	-0.51	1.13	0.72	15T	0	L121
L122	38.17	-1.18	-0.55	0.90	0.74	50.71	-0.95	-0.40	1.30	0.84	15C	0	L122
L124	35.87	-3.48	-1.02	1.55	1.28	49.53	-2.13	-0.90	1.81	1.16	15T	0	L124
L126	39.60	0.25	0.12	1.64	1.52	51.53	-0.13	-0.05	1.68	1.08	15T	0	L126
L128	37.87	-1.48	-0.69	1.30	1.12	51.13	-0.53	-0.22	0.99	0.63	15T	0	L128
L131	44.00	4.65	2.47	1.31	1.08	54.93	3.27	1.39	1.98	1.27	15A	0	L131
L134	41.07	1.72	0.80	0.88	0.73	52.40	0.74	0.31	0.99	0.63	15C	0	L134
L139	40.53	1.18	0.55	0.83	0.69	52.53	0.87	0.37	1.46	0.93	15T	0	L139
L141	37.73	-1.62	-0.73	1.44	1.18	49.33	-2.33	-0.99	0.98	0.63	15T	0	L141
L143	36.93	-2.42	-1.14	1.28	1.05	46.53	-3.13	-1.32	1.46	0.93	15T	0	L143
L145	29.80	-9.55	-4.05	1.47	1.21	35.53	-16.13	-6.83	5.26	3.37	15T	#	L145
L148	39.47	0.12	0.05	0.92	0.75	52.00	0.34	0.14	0.76	0.48	15T	0	L148
L150	37.45	-1.90	-0.69	0.34	0.28	49.08	-2.58	-1.09	1.20	0.77	15T	0	L150
L157	35.93	-3.42	-1.05	0.88	0.73	47.67	-3.79	-1.61	1.25	0.80	15T	0	L157
L158	40.00	0.65	0.30	2.00	1.65	46.53	-3.13	-1.32	1.77	1.13	15R	*	L158
L159	38.80	-0.55	-0.20	1.52	1.25	49.73	-1.93	-0.82	2.09	1.34	15L	0	L159
L162	36.53	-2.82	-1.01	0.74	0.61	50.00	-1.66	-0.70	1.07	0.69	15T	0	L162
L163	40.87	1.52	0.71	1.13	0.93	52.87	1.21	0.51	1.60	1.02	15T	0	L163
L166	38.07	-1.28	-0.60	1.22	1.01	52.33	0.67	0.28	1.40	0.90	15T	0	L166
L170	39.07	-0.28	-0.13	1.03	0.85	52.20	0.54	0.23	1.01	0.65	15T	0	L170
L176	37.73	-1.62	-0.73	1.28	1.05	53.07	1.41	0.60	1.28	0.82	15T	0	L176
L182A	38.67	-0.68	-0.32	1.18	0.97	49.00	-2.66	-1.13	2.33	1.49	15A	0	L182A
L182T	40.93	1.58	0.74	1.22	1.01	54.13	2.47	1.05	2.00	1.28	15T	0	L182T
L183	39.87	0.52	0.24	0.83	0.69	52.20	0.54	0.23	0.94	0.60	15T	0	L183
L185	37.47	-1.68	-0.68	0.74	0.61	51.33	-0.33	-0.14	1.05	0.67	15T	0	L185
L189	39.33	-0.02	-0.01	0.98	0.80	51.47	-0.19	-0.08	1.36	0.87	15T	0	L189
L190C	38.67	-0.68	-0.32	0.90	0.74	50.73	-0.93	-0.39	1.33	0.86	15T	0	L190C
L191	39.47	0.12	0.05	1.41	1.16	51.73	0.07	0.03	3.53	2.27	15T	0	L191
L194	45.30	5.95	2.77	2.73	2.25	50.50	4.84	2.05	1.28	0.82	15T	*	L194
L195	38.13	-1.22	-0.57	1.41	1.16	50.27	-1.39	-0.59	1.49	0.95	15C	0	L195
L206	38.47	-0.68	-0.31	1.13	0.93	50.40	-1.26	-0.53	1.59	1.28	15T	0	L206
L207	49.09	9.74	4.54	1.47	1.21	51.80	0.14	0.06	1.06	0.68	15R	#	L207
L211	36.73	-2.62	-1.22	0.59	0.49	49.00	-2.66	-1.13	1.25	0.80	15R	0	L211
L212	39.73	0.38	0.18	4.50	3.70	50.40	4.74	2.01	4.47	2.86	15T	*	L212
L213	41.33	1.98	0.92	1.23	1.02	53.00	1.94	0.82	1.06	0.68	15T	0	L213
L217	37.62	-1.73	-0.61	0.99	0.81	48.64	-2.82	-1.19	1.04	0.67	15Q	0	L217
L223	40.29	0.94	0.44	1.07	0.88	52.01	0.35	0.15	1.09	0.70	15R	0	L223
L224	35.53	-3.82	-1.70	0.52	0.43	40.67	-4.99	-2.11	1.11	0.71	15T	0	L224
L225	41.80	2.45	1.14	0.77	0.64	NO DATA REPORTED FOR SAMPLE G15					15T	#	L225
L228	35.87	-3.48	-1.02	2.07	1.70	40.13	-11.53	-4.88	2.20	1.41	15T	#	L228
L232	40.00	0.65	0.30	1.07	0.88	50.13	4.47	1.89	1.41	0.90	15T	*	L232
L233	37.93	-1.42	-0.60	0.80	0.66	51.20	-0.46	-0.19	1.93	1.24	15T	0	L233
L237A	38.60	-0.75	-0.35	1.12	0.92	53.13	1.47	0.62	1.19	0.76	15T	0	L237A
L237B	40.60	1.25	0.58	0.74	0.61	54.73	3.07	1.30	0.96	0.62	15T	0	L237B
L238A	36.27	-3.08	-1.04	1.03	0.85	49.33	-2.33	-0.99	2.50	1.60	15T	0	L238A
L241	42.73	3.38	1.58	1.33	1.10	50.67	5.01	2.12	1.45	0.93	15T	0	L241
L242	41.92	2.57	1.20	1.04	0.80	55.15	3.49	1.48	1.56	1.00	15U	0	L242
L243	37.60	-1.75	-0.62	1.30	1.07	51.53	-0.13	-0.05	1.19	0.76	15T	0	L243
L244	42.80	3.45	1.61	0.94	0.77	50.00	4.34	1.84	1.73	1.11	15C	0	L244
L248	39.44	0.09	0.04	0.63	0.52	51.00	-0.66	-0.28	1.72	1.11	15J	0	L248
L249	42.00	2.65	1.23	4.09	3.37	51.73	0.07	0.03	1.03	0.66	15T	0	L249
L254	38.53	-0.82	-0.30	0.92	0.75	51.47	-0.19	-0.08	1.19	0.76	15T	0	L254
L255	39.13	-0.22	-0.10	0.83	0.69	49.87	-1.79	-0.76	0.92	0.59	15T	0	L255
L259	42.80	3.45	1.61	1.15	0.94	50.20	4.54	1.92	1.08	0.69	15T	0	L259
L261	37.33	-2.02	-0.74	1.45	1.19	47.80	-3.86	-1.63	1.48	0.95	15T	0	L261
L262	40.07	0.72	0.33	0.80	0.68	51.40	-0.26	-0.11	0.74	0.47	15T	0	L262
L264	40.00	0.65	0.30	2.14	1.70	52.27	0.61	0.26	1.83	1.17	15T	0	L264
L268	39.60	0.25	0.12	1.12	0.92	51.85	0.15	0.08	1.48	0.95	15T	0	L268
L273	36.27	-3.08	-1.04	1.22	1.01	51.47	-0.19	-0.08	1.66	1.02	15T	0	L273
L275	41.87	2.52	1.17	0.99	0.82	53.27	1.61	0.68	1.49	0.95	15T	0	L275

ANALYSIS T15-1 TABLE 1
 TEARING STRENGTH, GRAMS - PRIMARILY PRINTING PAPERS
 TAPPI TENTATIVE TEST METHOD T414 TS-65, INTERNAL TEARING RESISTANCE OF PAPER

LAB CODE	SAMPLE E85 MEAN	BOND 79 GRAMS PER SQUARE METER				SAMPLE G15 MEAN	HEAT-SET OFFSET BOOK 93 GRAMS PER SQUARE METER				TEST D ₀ = 15		
		DEV	N ₀ DEV	SDR	R ₀ SDR		DEV	N ₀ DEV	SDR	R ₀ SDR	VAR	F	LAB
L278	41.73	2.38	1.44	1.28	1.05	55.33	3.67	1.56	1.80	1.15	15T	Ø	L278
L279	39.07	2.28	1.13	2.12	1.75	50.53	-1.13	2.48	1.60	1.02	15T	Ø	L279
L280	39.07	2.28	1.13	1.90	1.79	52.33	0.67	0.28	1.40	0.90	15L	Ø	L280
L281	39.20	2.15	1.07	1.37	1.13	50.13	-1.53	2.65	1.64	1.05	15T	Ø	L281
L285	35.73	-3.62	-1.00	3.28	2.70	47.73	-3.93	-1.66	2.12	1.36	15T	Ø	L285
L288	40.33	0.98	0.40	2.74	2.26	53.87	2.21	0.93	1.60	1.02	15T	Ø	L288
L290	41.07	1.72	0.00	0.90	0.79	51.80	0.14	0.06	1.21	0.77	15T	Ø	L290
L291	39.60	0.25	0.12	0.83	0.68	49.80	-1.86	-0.79	1.32	0.85	15A	Ø	L291
L303	42.93	3.58	1.07	1.83	1.51	50.53	4.87	2.06	2.07	1.32	15L	Ø	L303
L305	37.53	-1.82	-0.63	0.92	0.75	51.27	-0.39	-0.17	1.53	0.98	15T	Ø	L305
L309	40.07	0.72	0.33	0.90	0.79	52.67	1.01	0.43	1.84	1.18	15T	Ø	L309
L311	40.67	1.32	0.01	1.95	1.61	52.40	0.74	0.31	1.88	1.21	15T	Ø	L311
L312	38.73	-0.62	-0.29	1.10	0.91	50.07	-1.59	-0.67	2.28	1.46	15T	Ø	L312
L313	38.93	-0.42	-0.19	2.12	1.75	52.13	0.47	0.20	2.45	1.57	15L	Ø	L313
L315	39.47	0.12	0.03	1.30	1.07	53.29	1.63	0.69	0.95	0.61	15T	Ø	L315
L321	40.80	1.45	0.03	1.00	0.89	52.67	1.01	0.43	1.35	0.86	15T	Ø	L321
L328	39.47	0.12	0.03	1.19	0.98	50.90	-0.76	-0.32	1.07	0.69	15T	Ø	L328
L333	42.40	3.05	1.42	1.30	1.07	53.87	2.21	0.93	1.36	0.87	15T	Ø	L333
L334	36.67	-2.68	-1.23	0.62	0.51	49.73	-1.93	-0.82	1.49	0.95	15T	Ø	L334
L336	39.53	0.18	0.09	0.99	0.82	52.00	0.34	0.14	1.60	1.03	15T	Ø	L336
L344	38.00	-1.35	-0.03	0.85	0.70	51.40	-0.26	-0.11	2.82	1.81	15C	Ø	L344
L345	39.47	0.12	0.03	0.74	0.61	52.33	0.67	0.28	1.05	0.67	15T	Ø	L345
L348	38.93	-0.42	-0.19	1.03	0.85	54.40	2.74	1.16	1.35	0.87	15T	Ø	L348
L352	44.19	4.84	2.43	2.24	1.84	50.42	4.76	2.02	2.94	1.88	15C	Ø	L352
L358	43.87	4.52	2.10	0.92	0.75	55.07	3.41	1.44	1.03	0.66	15T	Ø	L358
L360	39.00	-0.35	-0.10	1.44	1.16	49.53	-2.13	-0.90	1.36	0.87	15T	Ø	L360
L376	37.13	-2.22	-1.03	0.99	0.82	49.20	-2.46	-1.04	1.82	1.17	15T	Ø	L376
L382	35.00	-4.35	-2.03	0.03	0.34	33.67	-17.99	-7.62	0.92	0.59	15T	#	L382
L386	34.40	-4.95	-2.31	1.12	0.92	46.40	-5.26	-2.23	1.55	0.99	15T	Ø	L386
L388	46.67	7.32	3.44	1.80	1.48	47.07	-4.59	-1.95	2.12	1.36	15T	X	L388
L390	39.67	0.32	0.13	1.50	1.23	54.13	2.47	1.05	1.51	0.97	15T	Ø	L390
L442	43.33	3.98	1.03	1.18	0.97	54.67	3.01	1.27	2.23	1.43	15R	Ø	L442
L558	37.67	-1.68	-0.70	0.82	0.67	49.47	-2.19	-0.93	1.19	0.76	15T	Ø	L558
L562	40.40	1.05	0.49	1.30	1.07	52.20	0.54	0.23	0.86	0.55	15T	Ø	L562
L565	40.13	0.78	0.30	2.42	1.99	52.67	1.01	0.43	1.18	0.75	15T	Ø	L565
L566	39.73	0.38	0.18	0.90	0.79	52.07	0.41	0.17	1.87	1.20	15T	Ø	L566
L574	39.67	0.32	0.13	2.00	1.69	51.87	0.21	0.09	2.45	1.57	15T	Ø	L574
L575	39.53	0.18	0.09	0.83	0.69	50.73	-0.93	-0.39	1.87	1.20	15L	Ø	L575
L576	41.27	1.92	0.89	1.03	0.85	54.60	2.94	1.24	2.16	1.39	15T	Ø	L576
L580	38.27	-1.08	-0.50	0.70	0.58	46.40	-3.26	-1.38	0.83	0.53	15T	Ø	L580
L581	38.64	-0.71	-0.33	0.00	0.54	52.33	0.67	0.28	0.97	0.62	15Q	Ø	L581
L587	39.87	0.52	0.24	0.92	0.75	52.53	0.87	0.37	1.41	0.90	15T	Ø	L587
L596	13.60	-25.75	-11.09	4.69	3.86	12.73	-38.93	-16.48	2.46	1.58	15T	#	L596
L599	39.53	0.18	0.09	0.83	0.69	50.27	-1.39	-0.59	1.39	0.89	15T	Ø	L599
L600	40.47	1.12	0.52	1.30	1.07	54.67	3.01	1.27	1.84	1.18	15T	Ø	L600
L604	51.73	12.38	5.77	1.98	1.63	46.53	-3.13	-1.32	2.56	1.64	15T	#	L604
L606	41.13	1.78	0.03	0.99	0.82	53.20	1.54	0.65	1.01	0.65	15T	Ø	L606
L610	44.27	4.92	2.29	2.37	1.95	58.00	6.34	2.68	2.73	1.75	15T	#	L610
L618	39.73	0.38	0.18	0.70	0.58	49.20	-2.46	-1.04	2.11	1.35	15T	Ø	L618
L622	26.67	-12.68	-5.91	0.82	0.67	25.33	-26.33	-11.15	0.90	0.58	15L	#	L622
L625	43.27	3.92	1.02	5.95	4.69	52.53	0.87	0.37	3.96	2.54	15T	#	L625
L626	37.13	-2.22	-1.03	0.04	0.53	49.93	-1.73	-0.73	1.33	0.86	15L	Ø	L626
L651	9.07	-30.28	-14.10	0.26	0.21	11.33	-40.33	-17.08	0.49	0.31	15T	#	L651
L652	39.71	0.30	0.17	2.40	2.03	51.87	0.21	0.09	2.33	1.49	15C	Ø	L652
L654	36.60	-2.75	-1.28	0.03	0.52	49.47	-2.19	-0.93	1.55	1.00	15T	Ø	L654
L670	36.80	-2.55	-1.19	1.08	0.89	46.53	-3.13	-1.32	1.68	1.08	15T	Ø	L670
L676	38.13	-1.22	-0.57	0.92	0.75	50.80	-0.86	-0.36	1.97	1.26	15T	Ø	L676
L684	39.20	-0.15	-0.07	1.47	1.21	49.20	-2.46	-1.04	5.39	3.45	15L	Ø	L684
L685	42.80	3.45	1.01	1.52	1.25	53.47	1.81	0.76	1.77	1.13	15T	Ø	L685
L692	37.33	-2.02	-0.94	1.05	0.86	50.13	-1.53	-0.65	0.99	0.63	15T	Ø	L692
L696	32.93	-6.42	-2.99	1.28	1.05	47.07	-4.59	-1.95	1.28	0.82	15T	#	L696
L697	39.15	-0.20	-0.09	0.87	0.72	51.56	-0.10	-0.04	1.39	0.89	15T	Ø	L697
L698	37.93	-1.42	-0.60	0.80	0.66	51.67	0.01	0.00	1.76	1.13	15L	Ø	L698
L704	38.67	-0.68	-0.32	2.09	1.72	NO DATA REPORTED FOR SAMPLE G15					15T	M	L704
L735	38.27	-1.08	-0.50	1.49	1.22	50.40	-1.26	-0.53	1.55	0.99	15T	Ø	L735

GR₀ MEAN = 39.35 GRAMS

GRAND MEAN = 51.66 GRAMS

TEST DETERMINATIONS = 15

SD MEANS = 2.15 GRAMS

SD OF MEANS = 2.36 GRAMS

118 LABS IN GRAND MEANS

AVERAGE SDR = 1.21 GRAMS

AVERAGE SDR = 1.56 GRAMS

GR₀ MEAN = 385.9 MILLINEWTON

GRAND MEAN = 500.6 MILLINEWTON

ANALYSIS T15-1 TABLE 1
 TEARING STRENGTH, GRAMS - PRIMARILY PRINTING PAPERS
 TAPPI TENTATIVE TEST METHOD T414 TS-65, INTERNAL TEARING RESISTANCE OF PAPER

LAB CODE	BOND 79 GRAMS PER SQUARE METER					HEAT-SET OFFSET BOOK 93 GRAMS PER SQUARE METER					TEST D ₀ = 15		
	SAMPLE E85 MEAN	DEV	N ₀ DEV	SDR	R ₀ SDR	SAMPLE G15 MEAN	DEV	N ₀ DEV	SDR	R ₀ SDR	VAR	F	LAB
L155	40.93	1.53	.74	2.28	1.88	50.00	-1.66	-.70	1.85	1.19	15X	*	L155
L167	40.80	1.45	.80	1.01	.83	52.83	1.17	.50	1.28	.82	15W	*	L167
L226B	38.53	-.82	-.38	1.19	.98	50.67	-.99	-.42	1.45	.93	15V	*	L226B
L226C	39.39	.04	.02	1.40	1.21	50.43	-1.23	-.52	1.27	.81	15V	*	L226C
L250L	44.47	5.12	2.38	1.41	1.16	53.93	2.27	.96	1.49	.95	15H	*	L250L
L251	38.20	-1.15	-.54	1.70	1.40	50.20	-1.46	-.62	1.82	1.17	15K	*	L251
L301A	37.13	-2.22	-1.00	.99	.82	48.13	-3.53	-1.49	1.19	.76	15N	*	L301A
L326	43.53	4.18	1.50	7.07	5.82	50.07	-1.59	-.67	1.67	1.07	15N	*	L326
L339	40.67	1.32	.61	1.18	.97	56.07	4.41	1.87	1.71	1.10	15N	*	L339
L341	40.80	1.40	.88	.94	.77	53.93	2.27	.96	1.62	1.04	15N	*	L341
L356	38.20	-1.15	-.54	1.20	1.04	53.40	1.74	.74	2.16	1.39	15N	*	L356
L396M	39.93	.58	.27	1.67	1.37	53.13	1.47	.62	1.30	.83	15V	*	L396M
L585	42.80	3.45	1.01	1.20	1.04	57.33	5.67	2.40	2.09	1.34	15E	*	L585
L680	37.73	-1.62	-.70	1.28	1.05	50.93	-.73	-.31	1.28	.82	15V	*	L680
L705	39.73	.38	.10	1.83	1.51	49.07	-2.59	-1.10	2.81	1.80	15X	*	L705
L706	37.33	-2.02	-.94	.98	.80	51.20	-.46	-.19	4.13	2.65	15V	*	L706
L734	38.67	-.68	-.32	1.63	1.34	52.07	.61	.26	4.33	2.78	15N	*	L734
L738	39.07	-.28	-.10	1.67	1.37	53.07	1.41	.60	1.67	1.07	15X	*	L738
TOTAL NUMBER OF LABORATORIES REPORTING = 18													
Best values: E85 39.5 ± 3.5 grams													
G15 51.6 ± 4.0 grams													

The following laboratories were omitted from the grand means because of extreme test results: 107, 145, 207, 228, 382, 604, 622.

Data from the following laboratories appear to be off by a multiplicative factor: 596, 651.

Data from the following laboratories appeared to be off by a multiplicative factor: 226B, 226C, 396M, 680, 706. Code 15V was assigned temporarily put in a factor of 2.

ANALYSIS T15-1 TABLE 2

TEARING STRENGTH, GRAMS - PRIMARILY PRINTING PAPERS

TAPPI TENTATIVE TEST METHOD T414 TS-65, INTERNAL TEARING RESISTANCE OF PAPER

LAB CODE	F	MEANS		COORDINATES		AVG E _{0.5} VAR	PROPERTY---TEST INSTRUMENT---CONDITIONS				
		E85	G15	MAJOR	MINOR						
L651	#	9.07	11.33	-50.26	-4.15	.26	15T	TEARING	STRENGTH	35	T0 110G, THWING-ELMENDORF (SCALE T0 100)
L596	#	13.60	12.73	-40.20	-0.61	2.72	15T	TEARING	STRENGTH	35	T0 110G, THWING-ELMENDORF (SCALE T0 100)
L622	#	26.67	25.33	-28.10	-8.01	.62	15L	TEARING	STRENGTH	35	T0 110G, LORENTZ-WETTRES
L145	#	25.80	35.53	-18.40	-3.57	2.29	15T	TEARING	STRENGTH	35	T0 110G, THWING-ELMENDORF (SCALE T0 100)
L696	#	32.93	47.07	-7.70	1.75	.54	15T	TEARING	STRENGTH	35	T0 110G, THWING-ELMENDORF (SCALE T0 100)
L386	#	34.40	46.40	-7.22	.21	.96	15T	TEARING	STRENGTH	35	T0 110G, THWING-ELMENDORF (SCALE T0 100)
L382	#	35.00	33.67	-10.34	-0.70	.56	15T	TEARING	STRENGTH	35	T0 110G, THWING-ELMENDORF (SCALE T0 100)
L224	#	35.53	46.67	-0.27	-0.46	.57	15T	TEARING	STRENGTH	35	T0 110G, THWING-ELMENDORF (SCALE T0 100)
L285	#	35.73	47.73	-0.34	.10	2.63	15T	TEARING	STRENGTH	35	T0 110G, THWING-ELMENDORF (SCALE T0 100)
L228	#	35.87	40.13	-10.93	-0.05	1.30	15T	TEARING	STRENGTH	35	T0 110G, THWING-ELMENDORF (SCALE T0 100)
L124	#	35.87	49.53	-3.90	1.19	1.22	15T	TEARING	STRENGTH	35	T0 110G, THWING-ELMENDORF (SCALE T0 100)
L157	#	35.93	47.87	-5.11	.03	.76	15T	TEARING	STRENGTH	35	T0 110G, THWING-ELMENDORF (SCALE T0 100)
L273	#	36.27	51.47	-2.19	2.18	1.02	15T	TEARING	STRENGTH	35	T0 110G, THWING-ELMENDORF (SCALE T0 100)
L238A	#	36.27	49.33	-3.79	.76	1.23	15T	TEARING	STRENGTH	35	T0 110G, THWING-ELMENDORF (SCALE T0 100)
L162	#	36.53	50.00	-3.11	1.00	.65	15T	TEARING	STRENGTH	35	T0 110G, THWING-ELMENDORF (SCALE T0 100)
L654	#	36.60	49.47	-3.47	.60	.76	15T	TEARING	STRENGTH	35	T0 110G, THWING-ELMENDORF (SCALE T0 100)
L334	#	36.67	49.73	-3.22	.73	.73	15T	TEARING	STRENGTH	35	T0 110G, THWING-ELMENDORF (SCALE T0 100)
L211	#	36.73	49.00	-3.73	.19	.65	15K	TEARING	STRENGTH	35	T0 110G, THWING-ELMENDORF, DIGITAL READOUT
L670	#	36.80	48.53	-4.03	-.17	.59	15T	TEARING	STRENGTH	35	T0 110G, THWING-ELMENDORF (SCALE T0 100)
L143	#	36.93	48.53	-3.94	-.27	.59	15T	TEARING	STRENGTH	35	T0 110G, THWING-ELMENDORF (SCALE T0 100)
L301A	+	37.13	48.13	-4.11	-.69	.79	15N	TEARING	STRENGTH	35	T0 110G, THWING-ELMENDORF, NO CUT OUT
L626	#	37.13	49.93	-2.70	.51	.69	15L	TEARING	STRENGTH	35	T0 110G, LORENTZ-WETTRES
L376	#	37.13	49.20	-3.31	.02	.99	15T	TEARING	STRENGTH	35	T0 110G, THWING-ELMENDORF (SCALE T0 100)
L706	+	37.33	51.20	-1.68	1.20	1.72	15V	TEARING	STRENGTH	35	T0 110G, THWING-ELMENDORF X 2
L692	#	37.33	50.13	-2.48	.49	.75	15T	TEARING	STRENGTH	35	T0 110G, THWING-ELMENDORF (SCALE T0 100)
L261	#	37.33	47.80	-4.23	-1.06	1.07	15T	TEARING	STRENGTH	35	T0 110G, THWING-ELMENDORF (SCALE T0 100)
L150	#	37.45	49.08	-3.19	-.29	.53	15T	TEARING	STRENGTH	35	T0 110G, THWING-ELMENDORF (SCALE T0 100)
L185	#	37.47	51.33	-1.50	1.19	.64	15T	TEARING	STRENGTH	35	T0 110G, THWING-ELMENDORF (SCALE T0 100)
L305	#	37.53	51.27	-1.50	1.10	.67	15T	TEARING	STRENGTH	35	T0 110G, THWING-ELMENDORF (SCALE T0 100)
L243	#	37.60	51.53	-1.20	1.22	.91	15T	TEARING	STRENGTH	35	T0 110G, THWING-ELMENDORF (SCALE T0 100)
L217	#	37.62	48.84	-3.20	-.58	.74	15Q	TEARING	STRENGTH	35	T0 110G, THWING-ELMENDORF, AIR CLAMP, DIGIT
L558	#	37.67	49.47	-2.76	-.20	.72	15T	TEARING	STRENGTH	35	T0 110G, THWING-ELMENDORF (SCALE T0 100)
L680	+	37.73	50.93	-1.02	.73	.54	15V	TEARING	STRENGTH	35	T0 110G, THWING-ELMENDORF X 2
L103	#	37.73	50.40	-2.02	.37	.69	15T	TEARING	STRENGTH	35	T0 110G, THWING-ELMENDORF (SCALE T0 100)
L176	#	37.73	53.07	-.02	2.14	.54	15T	TEARING	STRENGTH	35	T0 110G, THWING-ELMENDORF (SCALE T0 100)
L141	#	37.73	49.33	-2.81	-.34	.90	15T	TEARING	STRENGTH	35	T0 110G, THWING-ELMENDORF (SCALE T0 100)
L118	#	37.80	49.73	-2.47	-.12	1.00	15T	TEARING	STRENGTH	35	T0 110G, THWING-ELMENDORF (SCALE T0 100)
L105	#	37.87	49.47	-2.63	-.35	1.18	15T	TEARING	STRENGTH	35	T0 110G, THWING-ELMENDORF (SCALE T0 100)
L128	#	37.87	51.13	-1.38	.76	.68	15T	TEARING	STRENGTH	35	T0 110G, THWING-ELMENDORF (SCALE T0 100)
L698	#	37.93	51.67	-.94	1.06	.89	15L	TEARING	STRENGTH	35	T0 110G, LORENTZ-WETTRES
L233	#	37.93	51.20	-1.29	.75	.95	15T	TEARING	STRENGTH	35	T0 110G, THWING-ELMENDORF (SCALE T0 100)
L344	#	38.00	51.40	-1.09	.84	1.25	15C	TEARING	STRENGTH	35	T0 110G, THWING-ELMENDORF (W.AIR CLAMP)
L166	#	38.07	52.33	-.35	1.41	.95	15T	TEARING	STRENGTH	35	T0 110G, THWING-ELMENDORF (SCALE T0 100)
L676	#	38.13	50.80	-1.45	.34	1.01	15T	TEARING	STRENGTH	35	T0 110G, THWING-ELMENDORF (SCALE T0 100)
L195	#	38.13	50.27	-1.65	-.02	1.06	15C	TEARING	STRENGTH	35	T0 110G, THWING-ELMENDORF (W.AIR CLAMP)
L122	#	38.17	50.71	-1.49	.25	.79	15C	TEARING	STRENGTH	35	T0 110G, THWING-ELMENDORF (W.AIR CLAMP)
L356	+	38.20	53.40	.54	2.02	1.21	15N	TEARING	STRENGTH	35	T0 110G, THWING-ELMENDORF, NO CUT OUT
L251	+	38.20	50.20	-1.86	-.11	1.26	15K	TEARING	STRENGTH	35	T0 110G, LORENTZ-WETTRES, 20 C, 65% RH
L735	#	38.27	50.40	-1.06	-.03	1.11	15T	TEARING	STRENGTH	35	T0 110G, THWING-ELMENDORF (SCALE T0 100)
L580	#	38.27	48.40	-3.10	-1.36	.56	15T	TEARING	STRENGTH	35	T0 110G, THWING-ELMENDORF (SCALE T0 100)
L206	#	38.47	50.40	-1.53	-.18	1.10	15T	TEARING	STRENGTH	35	T0 110G, THWING-ELMENDORF (SCALE T0 100)
L226B	+	38.53	50.67	-1.29	-.05	.95	15V	TEARING	STRENGTH	35	T0 110G, THWING-ELMENDORF X 2
L254	#	38.53	51.47	-.69	.48	.76	15T	TEARING	STRENGTH	35	T0 110G, THWING-ELMENDORF (SCALE T0 100)
L237A	#	38.60	53.13	.00	1.54	.64	15T	TEARING	STRENGTH	35	T0 110G, THWING-ELMENDORF (SCALE T0 100)
L581	#	38.64	52.33	.03	.98	.58	15Q	TEARING	STRENGTH	35	T0 110G, THWING-ELMENDORF, AIR CLAMP, DIGIT
L734	+	38.67	52.27	-.00	.91	2.10	15N	TEARING	STRENGTH	35	T0 110G, THWING-ELMENDORF, NO CUT OUT
L704	M	38.67				1.72	15T	TEARING	STRENGTH	35	T0 110G, THWING-ELMENDORF (SCALE T0 100)
L182A	#	38.67	49.60	-2.44	-1.20	1.23	15A	TEARING	STRENGTH	35	T0 110G, APPITA
L190C	#	38.67	50.73	-1.15	-.10	.60	15T	TEARING	STRENGTH	35	T0 110G, THWING-ELMENDORF (SCALE T0 100)
L312	#	38.73	50.07	-1.00	-.60	1.18	15T	TEARING	STRENGTH	35	T0 110G, THWING-ELMENDORF (SCALE T0 100)
L159	#	38.80	49.73	-1.81	-.87	1.29	15L	TEARING	STRENGTH	35	T0 110G, LORENTZ-WETTRES
L348	#	38.93	54.40	1.77	2.13	.66	15T	TEARING	STRENGTH	35	T0 110G, THWING-ELMENDORF (SCALE T0 100)
L313	#	38.93	52.13	.08	.63	1.00	15L	TEARING	STRENGTH	35	T0 110G, LORENTZ-WETTRES
L360	#	39.00	49.53	-1.82	-1.15	1.02	15T	TEARING	STRENGTH	35	T0 110G, THWING-ELMENDORF (SCALE T0 100)
L738	+	39.07	53.07	.86	1.15	1.22	15X	TEARING	STRENGTH	35	T0 110G: GIVE INSTRUMENT MAKE, MODEL

ANALYSIS T15-1 TABLE 2

TEARING STRENGTH, GRAMS - PRIMARILY PRINTING PAPERS

TAPPI TENTATIVE TEST METHOD T414 TS-65, INTERNAL TEARING RESISTANCE OF PAPER

LAB CODE	F	MEANS		COORDINATES		AVG		PROPERTY---TEST INSTRUMENT---CONDITIONS				
		E85	G15	MAJOR	MINOR	S.D.	VAR					
L170	0	39.07	52.20	.21	.57	.75	15T	TEARING	STRENGTH	35	T0	110G, THWING-ELMENDORF (SCALE T0 100)
L280	0	39.07	52.33	.31	.66	.64	15L	TEARING	STRENGTH	35	T0	110G, LORENTZ-WETTRES
L279	0	39.07	50.53	-1.03	-.54	1.08	15T	TEARING	STRENGTH	35	T0	110G, THWING-ELMENDORF (SCALE T0 100)
L255	0	39.13	49.87	-1.48	-1.03	.64	15T	TEARING	STRENGTH	35	T0	110G, THWING-ELMENDORF (SCALE T0 100)
L697	0	39.15	51.56	-.21	.09	.60	15T	TEARING	STRENGTH	35	T0	110G, THWING-ELMENDORF (SCALE T0 100)
L684	0	39.20	49.20	-1.54	-1.52	2.03	15L	TEARING	STRENGTH	35	T0	110G, LORENTZ-WETTRES
L281	0	39.20	50.13	-1.24	-.90	1.09	15T	TEARING	STRENGTH	35	T0	110G, THWING-ELMENDORF (SCALE T0 100)
L189	0	39.33	51.47	-.10	-.12	.64	15T	TEARING	STRENGTH	35	T0	110G, THWING-ELMENDORF (SCALE T0 100)
L226C	*	39.39	50.43	-.90	-.85	1.01	15V	TEARING	STRENGTH	35	T0	110G, THWING-ELMENDORF X 2
L248	0	39.44	51.00	-.43	-.51	.61	15J	TEARING	STRENGTH	35	T0	110G, LORENTZ-WETTRES
L191	0	39.47	51.73	.13	-.04	1.71	15T	TEARING	STRENGTH	35	T0	110G, THWING-ELMENDORF (SCALE T0 100)
L345	0	39.47	52.33	.58	.36	.64	15T	TEARING	STRENGTH	35	T0	110G, THWING-ELMENDORF (SCALE T0 100)
L148	0	39.47	52.00	.33	.14	.62	15T	TEARING	STRENGTH	35	T0	110G, THWING-ELMENDORF (SCALE T0 100)
L328	0	39.47	50.90	-.49	-.59	.63	15T	TEARING	STRENGTH	35	T0	110G, THWING-ELMENDORF (SCALE T0 100)
L315	0	39.47	53.29	1.29	.99	.64	15T	TEARING	STRENGTH	35	T0	110G, THWING-ELMENDORF (SCALE T0 100)
L599	0	39.53	50.27	-.92	-1.06	.79	15T	TEARING	STRENGTH	35	T0	110G, THWING-ELMENDORF (SCALE T0 100)
L575	0	39.53	50.73	-.37	-.75	.94	15L	TEARING	STRENGTH	35	T0	110G, LORENTZ-WETTRES
L336	0	39.53	52.00	.38	.69	.52	15T	TEARING	STRENGTH	35	T0	110G, THWING-ELMENDORF (SCALE T0 100)
L291	0	39.60	49.80	-1.22	-1.42	.76	15A	TEARING	STRENGTH	35	T0	110G, APPITA
L126	0	39.60	51.53	.07	-.27	1.00	15T	TEARING	STRENGTH	35	T0	110G, THWING-ELMENDORF (SCALE T0 100)
L268	0	39.60	51.85	.31	-.06	.94	15T	TEARING	STRENGTH	35	T0	110G, THWING-ELMENDORF (SCALE T0 100)
L574	0	39.67	51.87	.36	-.10	1.03	15T	TEARING	STRENGTH	35	T0	110G, THWING-ELMENDORF (SCALE T0 100)
L390	0	39.67	54.13	2.06	1.41	1.10	15T	TEARING	STRENGTH	35	T0	110G, THWING-ELMENDORF (SCALE T0 100)
L652	0	39.71	51.87	.40	-.13	1.76	15C	TEARING	STRENGTH	35	T0	110G, THWING-ELMENDORF (W. AIR CLAMP)
L705	*	39.73	49.07	-1.08	-2.01	1.00	15X	TEARING	STRENGTH	35	T0	110G: GIVE INSTRUMENT MAKE, MODEL
L212	*	39.73	56.40	3.80	2.86	3.26	15T	TEARING	STRENGTH	35	T0	110G, THWING-ELMENDORF (SCALE T0 100)
L618	0	39.73	49.20	-1.38	-1.92	.57	15T	TEARING	STRENGTH	35	T0	110G, THWING-ELMENDORF (SCALE T0 100)
L566	0	39.73	52.07	.50	-.02	.99	15T	TEARING	STRENGTH	35	T0	110G, THWING-ELMENDORF (SCALE T0 100)
L587	0	39.87	52.53	1.00	.19	.63	15T	TEARING	STRENGTH	35	T0	110G, THWING-ELMENDORF (SCALE T0 100)
L183	0	39.87	52.20	.75	-.03	.64	15T	TEARING	STRENGTH	35	T0	110G, THWING-ELMENDORF (SCALE T0 100)
L396M	*	39.93	53.13	1.49	.54	1.10	15V	TEARING	STRENGTH	35	T0	110G, THWING-ELMENDORF X 2
L264	0	40.00	52.27	.88	-.08	1.47	15T	TEARING	STRENGTH	35	T0	110G, THWING-ELMENDORF (SCALE T0 100)
L158	*	40.00	48.53	-1.91	-2.56	1.39	15K	TEARING	STRENGTH	35	T0	110G, THWING-ELMENDORF, DIGITAL READOUT
L107	#	40.00	36.00	-11.27	-10.89	0.03	15T	TEARING	STRENGTH	35	T0	110G, THWING-ELMENDORF (SCALE T0 100)
L121	0	40.00	50.47	-.40	-1.28	.56	15T	TEARING	STRENGTH	35	T0	110G, THWING-ELMENDORF (SCALE T0 100)
L232	*	40.00	56.13	3.78	2.49	.89	15T	TEARING	STRENGTH	35	T0	110G, THWING-ELMENDORF (SCALE T0 100)
L309	0	40.07	52.67	1.23	.13	.58	15T	TEARING	STRENGTH	35	T0	110G, THWING-ELMENDORF (SCALE T0 100)
L262	0	40.07	51.40	.28	-.71	.50	15T	TEARING	STRENGTH	35	T0	110G, THWING-ELMENDORF (SCALE T0 100)
L565	0	40.13	52.67	1.27	.08	1.37	15T	TEARING	STRENGTH	35	T0	110G, THWING-ELMENDORF (SCALE T0 100)
L223	0	40.29	52.01	.89	-.47	.79	15R	TEARING	STRENGTH	35	T0	110G, THWING-ELMENDORF, DIGITAL READOUT
L288	0	40.33	53.87	2.30	.73	1.04	15T	TEARING	STRENGTH	35	T0	110G, THWING-ELMENDORF (SCALE T0 100)
L562	0	40.40	52.20	1.10	-.43	.61	15T	TEARING	STRENGTH	35	T0	110G, THWING-ELMENDORF (SCALE T0 100)
L600	0	40.47	54.67	2.99	1.16	1.13	15T	TEARING	STRENGTH	35	T0	110G, THWING-ELMENDORF (SCALE T0 100)
L139	0	40.53	52.53	1.44	-.30	.61	15L	TEARING	STRENGTH	35	T0	110G, THWING-ELMENDORF (SCALE T0 100)
L237B	0	40.60	54.73	3.13	1.11	.61	15T	TEARING	STRENGTH	35	T0	110G, THWING-ELMENDORF (SCALE T0 100)
L311	0	40.67	52.40	1.43	-.49	1.41	15T	TEARING	STRENGTH	35	T0	110G, THWING-ELMENDORF (SCALE T0 100)
L339	*	40.67	56.07	4.17	1.94	1.03	15N	TEARING	STRENGTH	35	T0	110G, THWING-ELMENDORF, NO CUT OUT
L115	0	40.67	49.60	-.67	-2.35	1.44	15C	TEARING	STRENGTH	35	T0	110G, THWING-ELMENDORF (W. AIR CLAMP)
L321	0	40.80	52.67	1.72	-.42	.68	15T	TEARING	STRENGTH	35	T0	110G, THWING-ELMENDORF (SCALE T0 100)
L341	*	40.80	53.93	2.00	.43	.91	15N	TEARING	STRENGTH	35	T0	110G, THWING-ELMENDORF, NO CUT OUT
L167	*	40.80	52.83	1.84	-.30	.63	15W	TEARING	STRENGTH	35	T0	110G, THWING-ELMENDORF X .5
L163	0	40.87	52.87	1.91	-.33	.58	15T	TEARING	STRENGTH	35	T0	110G, THWING-ELMENDORF (SCALE T0 100)
L155	*	40.93	50.00	-.19	-2.29	1.03	15X	TEARING	STRENGTH	35	T0	110G: GIVE INSTRUMENT MAKE, MODEL
L182T	0	40.93	54.13	2.90	.46	1.14	15T	TEARING	STRENGTH	35	T0	110G, THWING-ELMENDORF (SCALE T0 100)
L290	0	41.07	51.80	1.24	-1.19	.78	15T	TEARING	STRENGTH	35	T0	110G, THWING-ELMENDORF (SCALE T0 100)
L134	0	41.07	52.40	1.09	-.79	.68	15C	TEARING	STRENGTH	35	T0	110G, THWING-ELMENDORF (W. AIR CLAMP)
L606	0	41.13	53.20	2.34	-.31	.73	15T	TEARING	STRENGTH	35	T0	110G, THWING-ELMENDORF (SCALE T0 100)
L576	0	41.27	54.60	3.47	.52	1.12	15T	TEARING	STRENGTH	35	T0	110G, THWING-ELMENDORF (SCALE T0 100)
L213	0	41.33	53.60	2.77	-.19	.65	15T	TEARING	STRENGTH	35	T0	110G, THWING-ELMENDORF (SCALE T0 100)
L278	0	41.73	55.33	4.33	.66	1.10	15T	TEARING	STRENGTH	35	T0	110G, THWING-ELMENDORF (SCALE T0 100)
L225	M	41.80				.64	15T	TEARING	STRENGTH	35	T0	110G, THWING-ELMENDORF (SCALE T0 100)
L275	0	41.87	53.27	2.87	-.81	.68	15T	TEARING	STRENGTH	35	T0	110G, THWING-ELMENDORF (SCALE T0 100)
L242	0	41.92	55.15	4.32	.39	.93	15U	TEARING	STRENGTH	35	T0	110G, AUSTRALIAN OPT. CO.
L249	0	42.00	51.73	1.61	-1.93	2.01	15T	TEARING	STRENGTH	35	T0	110G, THWING-ELMENDORF (SCALE T0 100)
L333	0	42.40	53.87	3.67	-.81	.57	15J	TEARING	STRENGTH	35	T0	110G, THWING-ELMENDORF (SCALE T0 100)

ANALYSIS T15-1 TABLE 2

TEARING STRENGTH, GRAMS - PRIMARILY PRINTING PAPERS

TAPPI TENTATIVE TEST METHOD T414 TS-65, INTERNAL TEARING RESISTANCE OF PAPER

LAB CODE	F	MEANS		COORDINATES		AVG E ₀ SDR	VAR	PROPERTY---TEST INSTRUMENT---CONDITIONS		
		E85	G15	MAJOR	MINOR					
L241	Ø	42.73	56.67	5.99	0.80	1.01	15T	TEARING STRENGTH	35 TO	110G, THWING-ELMENDORF (SCALE TO 100)
L585	*	42.80	57.33	5.53	1.19	1.19	15E	TEARING STRENGTH	35 TO	110G, THWING-ELMENDORF, AMBIENT COND.
L259	Ø	42.80	56.20	5.58	0.44	0.52	15T	TEARING STRENGTH	35 TO	110G, THWING-ELMENDORF (SCALE TO 100)
L685	Ø	42.80	53.47	3.04	-1.38	1.19	15T	TEARING STRENGTH	35 TO	110G, THWING-ELMENDORF (SCALE TO 100)
L244	Ø	42.80	56.00	5.54	0.30	0.54	15C	TEARING STRENGTH	35 TO	110G, THWING-ELMENDORF (W ₀ AIR CLAMP)
L303	Ø	42.93	56.53	6.02	0.56	1.02	15L	TEARING STRENGTH	35 TO	110G, LORENTZ-WETTES
L625	*	43.27	52.53	3.25	-2.35	3.72	15T	TEARING STRENGTH	35 TO	110G, THWING-ELMENDORF (SCALE TO 100)
L442	Ø	43.33	54.67	4.89	-0.98	1.20	15R	TEARING STRENGTH	35 TO	110G, THWING-ELMENDORF, DIGITAL READOUT
L326	*	43.53	50.07	1.59	-4.19	3.44	15N	TEARING STRENGTH	35 TO	110G, THWING-ELMENDORF, NO CUT OUT
L358	Ø	43.87	55.07	5.55	-1.11	0.71	15T	TEARING STRENGTH	35 TO	110G, THWING-ELMENDORF (SCALE TO 100)
L131	Ø	44.00	54.93	5.54	-1.30	1.17	15A	TEARING STRENGTH	35 TO	110G, APPITA
L352	Ø	44.19	56.42	6.77	-0.45	1.55	15C	TEARING STRENGTH	35 TO	110G, THWING-ELMENDORF (W ₀ AIR CLAMP)
L610	*	44.27	58.00	8.00	0.54	1.55	15T	TEARING STRENGTH	35 TO	110G, THWING-ELMENDORF (SCALE TO 100)
L250L	*	44.47	53.93	5.10	-2.31	1.06	15R	TEARING STRENGTH	35 TO	110G, LHMARGY, 20 C, 65% RH
L194	*	45.30	56.50	7.57	-1.23	1.55	15T	TEARING STRENGTH	35 TO	110G, THWING-ELMENDORF (SCALE TO 100)
L388	X	46.67	47.07	1.43	-3.52	1.42	15T	TEARING STRENGTH	35 TO	110G, THWING-ELMENDORF (SCALE TO 100)
L207	#	49.09	51.80	6.58	-7.19	0.94	15R	TEARING STRENGTH	35 TO	110G, THWING-ELMENDORF, DIGITAL READOUT
L604	#	51.73	48.53	5.89	-11.33	1.04	15T	TEARING STRENGTH	35 TO	110G, THWING-ELMENDORF (SCALE TO 100)
GMEANS:		39.35	51.66			1.00				
		55% ELLIPSE:		7.56	2.47			WITH GAMMA = 48 DEGREES		

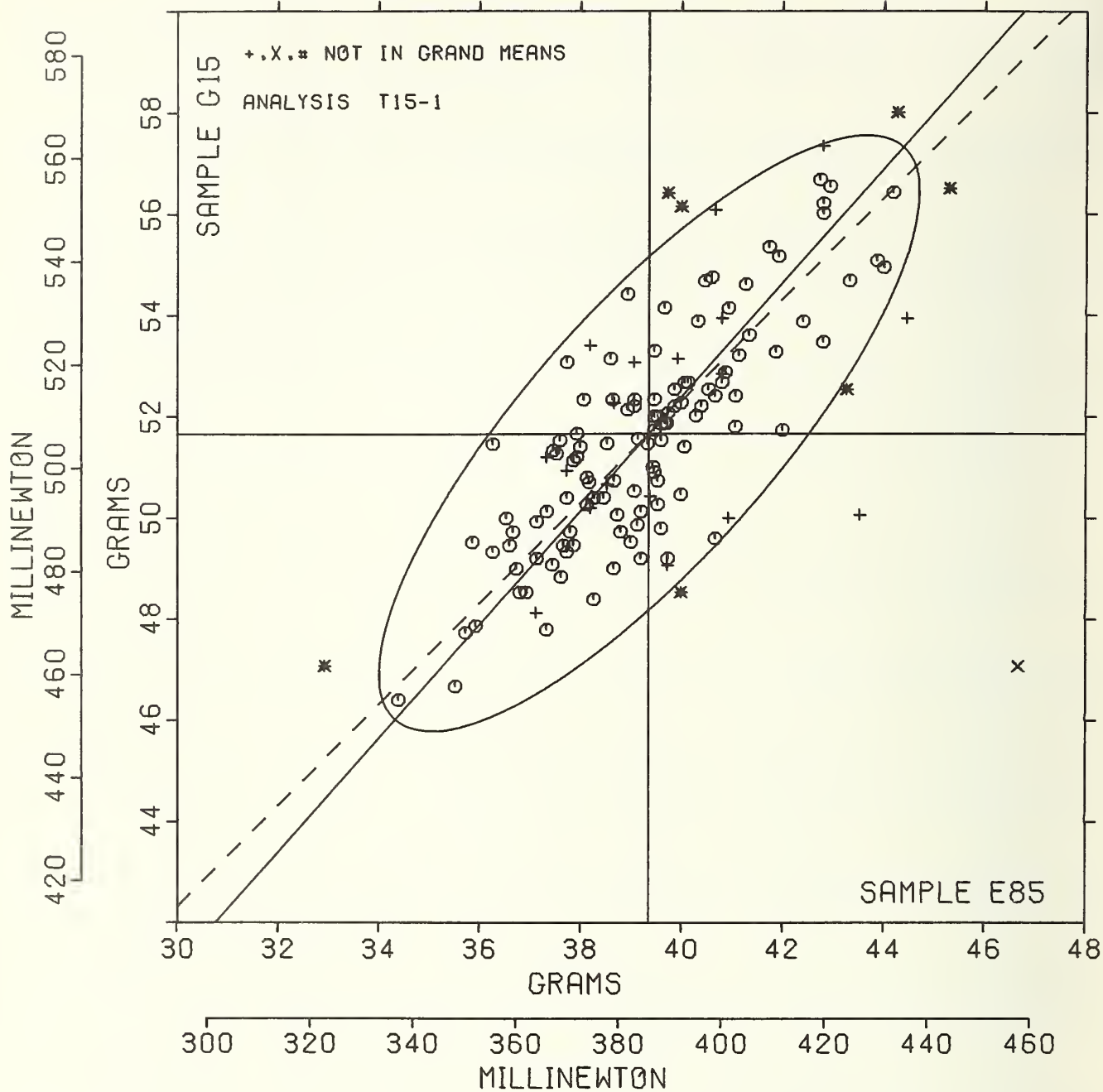
TEARING STRENGTH, PRINTING PAPERS

SAMPLE E85 = 39.4 GRAMS

SAMPLE G15 = 51.7 GRAMS

SAMPLE E85 = 386 MILLINEWTON

SAMPLE G15 = 507 MILLINEWTON



ANALYSIS T16-1 TABLE 1
 Tearing Strength, Grams - Primarily Packaging Papers
 TAPPI Tentative Test Method T-414 TS-65, Internal Tearing Resistance of Paper

LAB CODE	SAMPLE B63 124 GRAMS PER SQUARE METER					SAMPLE G19 106 GRAMS PER SQUARE METER					TEST D ₀ = 15		
	MEAN	DEV	N ₀ DEV	SDR	R ₀ SDR	MEAN	DEV	N ₀ DEV	SDR	R ₀ SDR	VAR	F	LAB
L122C	123.0	1.5	0.34	0.1	1.22	108.0	3.1	0.72	4.7	1.01	16C	0	L122C
L151	115.7	-5.8	-1.00	4.3	0.85	95.6	-9.3	-2.17	4.7	1.02	16C	0	L151
L230	120.8	-0.7	-0.17	4.7	0.94	106.9	2.0	0.47	5.7	1.23	16R	0	L230
L231T	121.9	0.3	0.07	5.8	1.10	106.9	2.0	0.47	5.5	1.20	16T	0	L231T
L248	126.0	4.4	1.00	2.8	0.57	107.9	3.0	0.70	3.8	0.82	16J	0	L248
L265	118.0	-3.5	-0.90	5.2	1.03	100.9	-4.0	-0.93	5.1	1.10	16T	0	L265
L324	130.2	8.7	1.94	7.7	1.34	108.3	3.4	0.78	2.6	0.57	16T	0	L324
L393	117.9	-3.7	-0.63	3.3	0.60	102.9	-2.0	-0.46	3.8	0.83	16T	0	L393
L554	120.4	-1.1	-0.20	5.2	1.04	106.7	1.8	0.41	5.6	1.22	16C	0	L554
L737	125.1	3.5	0.72	4.5	0.90	119.2	14.3	3.33	23.4	5.04	16C	#	L737
GR ₀ MEAN = 121.5 GRAMS					GRAND MEAN = 104.9 GRAMS					TEST DETERMINATIONS = 15			
SD MEANS = 4.5 GRAMS					SD OF MEANS = 4.3 GRAMS					9 LABS IN GRAND MEANS			
AVERAGE SDR = 5.0 GRAMS					AVERAGE SDR = 4.6 GRAMS								
GR ₀ MEAN = 1191.9 MILLINEWTON					GRAND MEAN = 1028.8 MILLINEWTON								
L106	130.8	9.3	2.40	6.8	1.36	112.9	8.0	1.87	4.4	0.95	16N	+	L106
L122N	134.5	13.0	2.92	7.1	1.41	114.1	9.2	2.15	3.8	0.82	16N	+	L122N
L148	132.1	10.6	2.50	4.7	0.94	116.8	11.9	2.77	4.8	1.04	16N	+	L148
L234	138.1	16.6	3.72	5.0	0.99	117.9	13.0	3.02	5.4	1.17	16N	+	L234
L267	139.9	18.3	4.11	6.5	1.29	118.7	13.8	3.21	5.4	1.17	16N	+	L267
L269	121.9	0.3	0.07	6.2	1.23	108.8	3.9	0.91	5.4	1.17	16N	+	L269
L301B	113.6	-7.9	-1.70	5.0	1.00	95.6	-9.3	-2.17	4.8	1.03	16N	+	L301B
L308	132.3	10.7	2.41	5.1	1.01	113.6	8.7	2.03	6.2	1.35	16N	+	L308
L702	117.6	-3.9	-0.69	5.4	1.08	101.9	-3.0	-0.71	6.6	1.42	16X	+	L702
L728	118.7	-2.9	-0.49	4.0	0.92	97.2	-7.7	-1.80	3.8	0.83	16N	+	L728
L730	117.1	-4.5	-1.00	4.3	0.85	106.9	2.0	0.46	2.7	0.58	16X	+	L730
L738	123.6	2.1	0.40	4.2	0.84	100.0	-4.9	-1.14	4.0	0.86	16V	+	L738
TOTAL NUMBER OF LABORATORIES REPORTING = 22													
Best values: B63 122 grams													
G19 107 grams													

The following laboratories were omitted from the grand means because of extreme test results: 737.

Data from the following laboratories appeared to be off by a multiplicative factor: 738, Code 16V was assigned temporarily to put in a factor of 2

ANALYSIS T10-1 TABLE 2

TEARING STRENGTH, GRAMS - PRIMARILY PACKAGING PAPERS

TAPPI TENTATIVE TEST METHOD T414 TS-65, INTERNAL TEARING RESISTANCE OF PAPER

LAB CODE	F	MEANS		COORDINATES		AVG		PROPERTY--TEST INSTRUMENT--CONDITIONS			
		B63	G19	MAJOR	MINOR	MAJOR	VAR				
L301B	+	113.6	95.6	-12.2	-1.3	1.02	16N	TEARING	STRENGTH	60	T6 150G, THWING-ELMENDORF, NO CUT OUT
L151	6	115.7	95.6	-10.5	-2.7	.93	16C	TEARING	STRENGTH	60	T6 150G, THWING-ELMENDORF (W. AIR CLAMP)
L730	+	117.1	106.9	-1.9	4.5	.72	16X	TEARING	STRENGTH	60	T6 150G: GIVE INSTRUMENT MAKE, MODEL
L702	+	117.6	101.9	-5.0	.5	1.25	16X	TEARING	STRENGTH	60	T6 150G: GIVE INSTRUMENT MAKE, MODEL
L393	6	117.9	102.9	-4.0	1.1	.75	16T	TEARING	STRENGTH	60	T6 150G, THWING-ELMENDORF (SCALE TO 100)
L265	6	118.0	100.9	-5.3	-.4	1.07	16F	TEARING	STRENGTH	60	T6 150G, THWING-ELMENDORF (SCALE TO 100)
L728	+	118.7	97.2	-7.4	-3.6	.88	16N	TEARING	STRENGTH	60	T6 150G, THWING-ELMENDORF, NO CUT OUT
L554	6	120.4	106.7	.4	2.1	1.13	16C	TEARING	STRENGTH	60	T6 150G, THWING-ELMENDORF (W. AIR CLAMP)
L230	6	120.8	106.9	.9	2.0	1.09	16E	TEARING	STRENGTH	60	T6 150G, THWING-ELMENDORF, DIGITAL READOUT
L231T	6	121.9	106.9	1.0	1.2	1.16	16T	TEARING	STRENGTH	60	T6 150G, THWING-ELMENDORF (SCALE TO 100)
L269	+	121.9	108.8	2.9	2.6	1.20	16N	TEARING	STRENGTH	60	T6 150G, THWING-ELMENDORF, NO CUT OUT
L122C	6	123.0	108.0	3.2	1.2	1.11	16C	TEARING	STRENGTH	60	T6 150G, THWING-ELMENDORF (W. AIR CLAMP)
L738	+	123.6	100.0	-1.9	-5.0	.85	16V	TEARING	STRENGTH	60	T6 150G, THWING-ELMENDORF X 2
L737	#	125.1	119.2	12.4	7.9	2.97	16C	TEARING	STRENGTH	60	T6 150G, THWING-ELMENDORF (W. AIR CLAMP)
L248	6	126.0	107.9	5.3	-.9	.85	16J	TEARING	STRENGTH	60	T6 150G, LOFENTZ-WETTRES
L324	6	130.2	108.3	8.6	-3.5	1.05	16T	TEARING	STRENGTH	60	T6 150G, THWING-ELMENDORF (SCALE TO 100)
L106	+	130.8	112.9	12.2	-.6	1.15	16N	TEARING	STRENGTH	60	T6 150G, THWING-ELMENDORF, NO CUT OUT
L148	+	132.1	116.8	15.9	1.3	.99	16N	TEARING	STRENGTH	60	T6 150G, THWING-ELMENDORF, NO CUT OUT
L308	+	132.3	113.6	13.8	-1.1	1.16	16N	TEARING	STRENGTH	60	T6 150G, THWING-ELMENDORF, NO CUT OUT
L122N	+	134.5	114.1	15.8	-2.3	1.12	16N	TEARING	STRENGTH	60	T6 150G, THWING-ELMENDORF, NO CUT OUT
L234	+	138.1	117.9	21.0	-2.1	1.08	16N	TEARING	STRENGTH	60	T6 150G, THWING-ELMENDORF, NO CUT OUT
L267	+	139.9	118.7	22.8	-2.7	1.23	16N	TEARING	STRENGTH	60	T6 150G, THWING-ELMENDORF, NO CUT OUT
GMEANS:		121.5	104.9			1.00					
		95% ELLIPSE:		19.2	0.7			WITH GAMMA = 43 DEGREES			

ANALYSIS T19-1 TABLE 1
TENSILE BREAKING STRENGTH, KILONEWTONS PER METER - PRIMARILY PACKAGING PAPERS
TAPPI OFFICIAL TEST METHODS T404 GS-76 AND T494 GS-70, PENDULUM AND CRE TYPES

LAB CODE	SAMPLE J02 98 GRAMS PER SQUARE METER					SAMPLE G17 118 GRAMS PER SQUARE METER					TEST D ₀ = 20		
	MEAN	DEV	NO. DEV	SDR	R ₀ SDR	MEAN	DEV	NO. DEV	SDR	R ₀ SDR	VAR	F	LAB
L106	5.46	-.20	-.007	.34	1.46	7.03	.14	.47	.39	1.02	19A	Ø	L106
L107	4.87	-.79	-2.000	.37	1.61	6.14	-.74	-2.48	.71	1.84	19A	*	L107
L122	5.44	-.22	-.74	.24	1.04	6.85	-.03	-.10	.35	.92	19A	Ø	L122
L126	5.48	-.18	-.004	.14	.46	6.80	-.09	-.28	.35	.90	19A	Ø	L126
L151	6.02	.37	1.024	.21	.91	7.37	.49	1.62	.42	1.09	19A	Ø	L151
L157A	6.01	.35	1.10	.19	.61	6.99	.10	.34	.25	.64	19P	Ø	L157A
L157I	5.13	-.53	-1.80	.20	.66	6.12	-.77	-2.57	.34	.89	19A	*	L157I
L167	6.11	.45	1.000	.24	1.03	7.67	.78	2.62	.34	.88	19G	*	L167
L182I	5.48	-.18	-.000	.28	1.20	6.53	-.36	-1.19	.36	.92	19D	Ø	L182I
L182L	5.68	.02	.007	.10	.70	6.63	-.06	-.20	.44	1.14	19T	Ø	L182L
L207	5.64	-.01	-.000	.17	.75	6.69	-.19	-.64	.42	1.08	19A	Ø	L207
L217A	5.71	.05	.10	.23	1.00	6.99	.11	.36	.40	1.02	19A	Ø	L217A
L217P	5.73	.07	.24	.17	.74	6.80	-.08	-.27	.39	1.00	19P	Ø	L217P
L225	5.83	.17	.000	.22	.95	7.12	.24	.79	.32	.83	19P	Ø	L225
L237A	5.78	.12	.41	.30	1.30	7.05	.16	.55	.41	1.07	19Q	Ø	L237A
L237B	5.37	-.29	-.90	.32	1.37	6.90	.02	.06	.49	1.26	19A	Ø	L237B
L238A	5.59	-.07	-.20	.24	1.04	6.81	-.07	-.24	.36	.92	19T	Ø	L238A
L243	5.39	-.20	-.90	.10	.58	6.75	-.14	-.47	.24	.61	19A	Ø	L243
L264A	5.72	.07	.22	.19	.82	7.09	.20	.68	.31	.81	19A	Ø	L264A
L264P	6.06	.40	1.007	.24	1.05	7.38	.49	1.64	.31	.80	19P	Ø	L264P
L265	5.81	.15	.000	.21	.91	6.90	.02	.06	.42	1.08	19A	Ø	L265
L267	5.62	-.04	-.10	.17	.73	6.83	-.06	-.20	.36	.92	19A	Ø	L267
L268A	5.96	.31	1.004	.17	.72	7.09	.21	.69	.37	.96	19A	Ø	L268A
L268P	6.45	.79	2.000	.61	2.65	6.63	-.26	-.86	.67	1.74	19P	X	L268P
L273	5.39	-.20	-.90	.33	1.41	6.86	-.02	-.07	.38	.98	19P	Ø	L273
L278	5.64	-.01	-.000	.10	.65	6.86	-.02	-.08	.40	1.03	19A	Ø	L278
L280	5.53	-.12	-.42	.22	.96	6.62	-.26	-.88	.28	.71	19G	Ø	L280
L281	5.95	.30	1.000	.10	.65	7.19	.30	1.00	.43	1.11	19G	Ø	L281
L305	6.15	.49	1.007	.20	1.11	7.27	.39	1.30	.37	.94	19P	Ø	L305
L312	5.95	.29	.90	.20	.84	6.84	-.04	-.14	.40	1.03	19D	Ø	L312
L324	5.51	-.10	-.30	.12	.51	6.69	-.19	-.64	.32	.84	19A	Ø	L324
L334	5.85	.19	.000	.10	.71	6.88	-.01	-.03	.23	.60	19P	Ø	L334
L336	180.90	175.24	59.044	8.00	34.51	224.90	218.01	727.28	12.77	33.01	19G	#	L336
L348	5.40	-.26	-.007	.30	1.27	NO DATA REPORTED FOR SAMPLE G17					19P	#	L348
L356	5.43	-.23	-.70	.28	1.21	6.67	-.22	-.73	.42	1.09	19P	Ø	L356
L554	5.89	.20	.70	.00	1.50	7.69	.20	.68	.39	1.01	19A	Ø	L554
L562	6.08	.43	1.40	.22	.95	6.54	-.35	-1.15	.17	.45	19P	X	L562
L565	6.05	.39	1.000	.19	.64	7.16	.27	.90	.34	.88	19T	Ø	L565
L568	6.05	.39	1.000	.18	.76	7.05	.16	.54	.36	.93	19P	Ø	L568
L575	5.53	-.13	-.40	.21	.91	6.87	-.02	-.05	.30	.77	19G	Ø	L575
L576	5.59	-.07	-.20	.18	.70	7.65	.16	.54	.28	.73	19A	Ø	L576
L580	5.98	.32	1.009	.20	.66	7.09	.20	.68	.39	1.02	19G	Ø	L580
L581	5.29	-.37	-1.000	.42	1.82	7.02	.14	.45	.31	.79	19A	*	L581
L604	5.42	-.24	-.80	.44	1.88	6.45	-.44	-1.46	.42	1.10	19A	Ø	L604
L606	5.73	.08	.20	.20	.85	6.58	.09	.31	.48	1.23	19P	Ø	L606
L610	5.16	-.50	-1.000	.22	.90	6.22	-.67	-2.23	.52	1.33	19A	Ø	L610
L622	6.68	1.03	3.40	.26	1.13	6.06	1.17	3.91	.47	1.22	19Ø	X	L622
L650	5.92	.20	.000	.29	1.24	7.25	.37	1.23	.44	1.13	19G	Ø	L650
L652	5.80	.14	.47	.22	.93	6.65	-.24	-.80	.37	.96	19A	Ø	L652
L676	5.78	.12	.41	.37	1.01	7.05	.17	.56	.49	1.26	19A	Ø	L676
L684	5.79	.14	.40	.40	1.92	6.68	-.21	-.69	.95	2.45	19W	Ø	L684
L689	5.11	-.55	-1.000	.21	.90	6.46	-.40	-1.33	.31	.80	19A	Ø	L689
L730	5.54	-.12	-.41	.14	.59	6.96	.07	.24	.41	1.06	19A	Ø	L730
L735	5.32	-.34	-1.000	.24	1.03	6.68	-.20	-.67	.37	.95	19A	Ø	L735
L737A	5.48	-.17	-.000	.21	.92	6.65	-.24	-.79	.46	1.20	19A	Ø	L737A
L737B	6.11	.46	1.000	.20	1.09	7.23	.34	1.15	.29	.75	19A	Ø	L737B
L738	5.37	-.29	-.90	.41	1.78	6.81	-.07	-.25	.43	1.11	19A	Ø	L738

GR₀ MEAN = 5.66 KILONEWTON/M

SD MEANS = .29 KILONEWTON/M

AVERAGE SDR = .23 KILONEWTON/M

GR₀ MEAN = 32.31 LB/INCH

GRAND MEAN = 6.69 KILONEWTON/M

SD OF MEANS = .30 KILONEWTON/M

AVERAGE SDR = .39 KILONEWTON/M

GRAND MEAN = 39.32 LB/INCH

TEST DETERMINATIONS = 20

52 LABS IN GRAND MEANS

L250I 3.36 -2.30 -7.79 .00 .27 4.06 -2.83 -9.42 .13 .34 19L * L250I
 L251 4.77 -.89 -3.00 .20 1.13 5.94 -.94 -3.14 .48 1.23 19I * L251
 L702 20.60 14.94 50.00 .75 3.24 24.46 17.58 58.64 1.53 3.95 19X * L702

TOTAL NUMBER OF LABORATORIES REPORTING = 60

Best values: J02 5.7 ± 0.5 kilonewton per meter

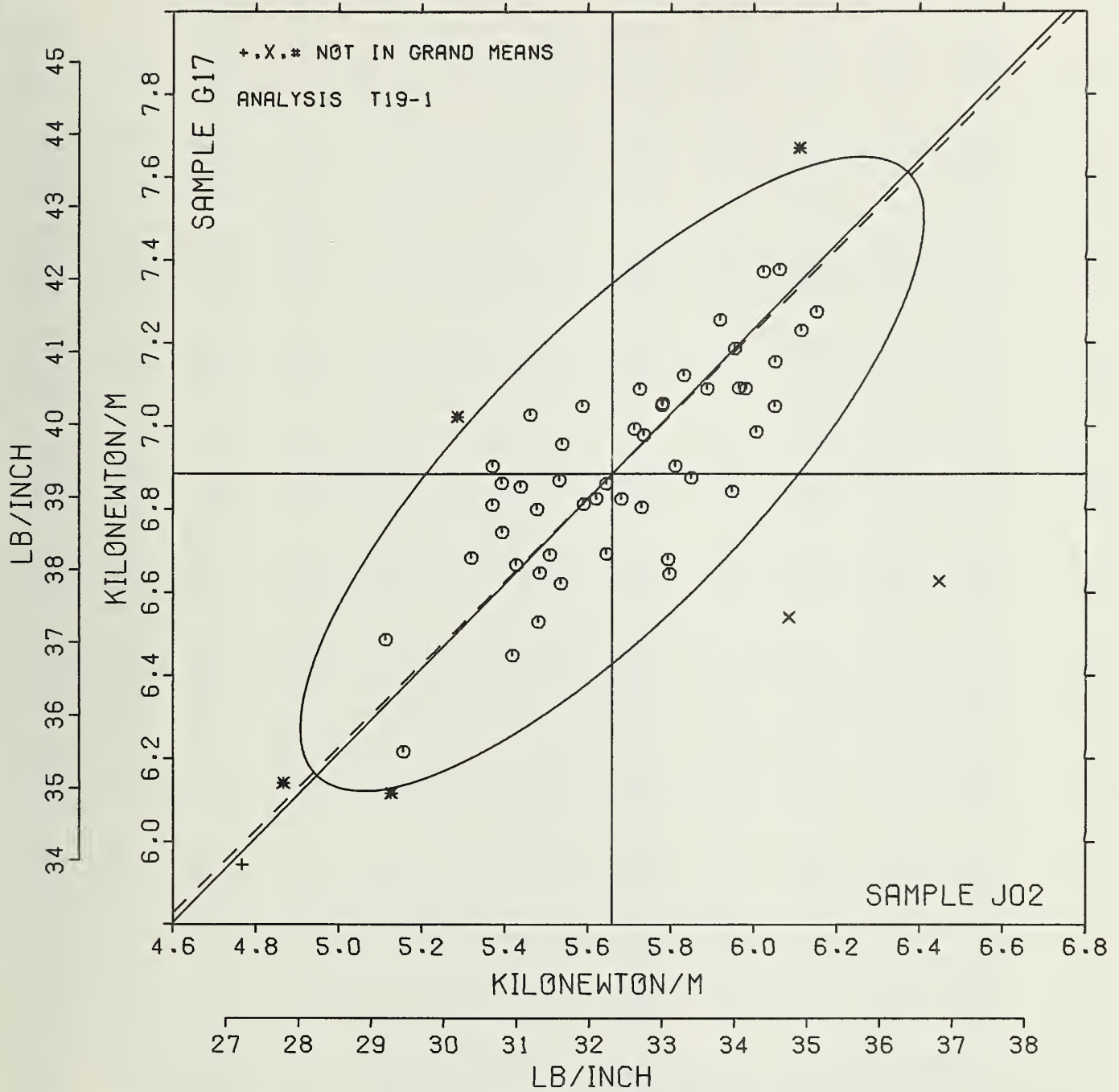
G17 6.9 ± 0.5 kilonewton per meter

ANALYSIS T19-1 TABLE 2
TENSILE BREAKING STRENGTH, KILONEWTONS PER METER - PRIMARILY PACKAGING PAPERS
TAPPI OFFICIAL TEST METHODS T404 GS-76 AND T494 GS-70, PENDULUM AND CRE TYPES

LAB CODE	F	MEANS		COORDINATES		Avg	PROPERTY---TEST INSTRUMENT---CONDITIONS				
		J02	G17	MAJOR	MINOR	NO. SUB	VAR				
L250I	+	3.36	4.06	-3.03	-0.34	0.30	19L	TENSILE STRENGTH	31	T6 74	LB/IN, CRE, 20 C, 65% RH
L251	+	4.77	5.94	-1.30	-0.02	1.18	19I	TENSILE STRENGTH	31	T6 74	LB/IN, CRE, 20C, 65% RH
L107	*	4.87	6.14	-1.09	0.04	1.73	19A	TENSILE STRENGTH	31	T6 74	LB/IN, LOAD CELL (CRE)
L689	Ø	5.11	6.49	-0.07	0.11	0.65	19A	TENSILE STRENGTH	31	T6 74	LB/IN, LOAD CELL (CRE)
L157I	*	5.13	6.12	-0.92	-0.10	0.08	19A	TENSILE STRENGTH	31	T6 74	LB/IN, LOAD CELL (CRE)
L610	Ø	5.10	6.22	-0.83	-0.11	1.15	19A	TENSILE STRENGTH	31	T6 74	LB/IN, LOAD CELL (CRE)
L581	*	5.29	7.02	-0.10	0.36	1.30	19A	TENSILE STRENGTH	31	T6 74	LB/IN, LOAD CELL (CRE)
L735	Ø	5.32	6.68	-0.38	0.10	0.99	19A	TENSILE STRENGTH	31	T6 74	LB/IN, LOAD CELL (CRE)
L738	Ø	5.37	6.81	-0.25	0.15	1.04	19A	TENSILE STRENGTH	31	T6 74	LB/IN, LOAD CELL (CRE)
L237B	Ø	5.37	6.90	-0.19	0.22	1.32	19A	TENSILE STRENGTH	31	T6 74	LB/IN, LOAD CELL (CRE)
L273	Ø	5.39	6.86	-0.20	0.17	1.20	19P	TENSILE STRENGTH	31	T6 74	LB/IN, PENDULUM TESTER
L243	Ø	5.39	6.75	-0.28	0.09	0.00	19A	TENSILE STRENGTH	31	T6 74	LB/IN, LOAD CELL (CRE)
L348	M	5.40				1.27	19P	TENSILE STRENGTH	31	T6 74	LB/IN, PENDULUM TESTER
L604	Ø	5.42	6.45	-0.48	-0.13	1.49	19A	TENSILE STRENGTH	31	T6 74	LB/IN, LOAD CELL (CRE)
L356	Ø	5.43	6.67	-0.32	0.01	1.15	19P	TENSILE STRENGTH	31	T6 74	LB/IN, PENDULUM TESTER
L122	Ø	5.44	6.85	-0.18	0.14	0.98	19A	TENSILE STRENGTH	31	T6 74	LB/IN, LOAD CELL (CRE)
L106	Ø	5.46	7.03	-0.04	0.24	1.24	19A	TENSILE STRENGTH	31	T6 74	LB/IN, LOAD CELL (CRE)
L126	Ø	5.48	6.80	-0.19	0.07	0.08	19A	TENSILE STRENGTH	31	T6 74	LB/IN, LOAD CELL (CRE)
L182I	Ø	5.48	6.53	-0.38	-0.12	1.00	19D	TENSILE STRENGTH	31	T6 74	LB/IN, LOAD CELL (CRE)
L737A	Ø	5.48	6.65	-0.29	-0.04	1.00	19A	TENSILE STRENGTH	31	T6 74	LB/IN, LOAD CELL (CRE)
L324	Ø	5.51	6.69	-0.24	-0.03	0.06	19A	TENSILE STRENGTH	31	T6 74	LB/IN, LOAD CELL (CRE)
L575	Ø	5.53	6.87	-0.10	0.08	0.24	19D	TENSILE STRENGTH	31	T6 74	LB/IN, LOAD CELL (CRE)
L280	Ø	5.53	6.62	-0.27	-0.10	0.04	19G	TENSILE STRENGTH	31	T6 74	LB/IN, LOAD CELL (CRE)
L730	Ø	5.54	6.96	-0.03	0.14	0.62	19A	TENSILE STRENGTH	31	T6 74	LB/IN, LOAD CELL (CRE)
L576	Ø	5.59	7.05	0.07	0.17	0.75	19A	TENSILE STRENGTH	31	T6 74	LB/IN, LOAD CELL (CRE)
L238A	Ø	5.59	6.81	-0.10	-0.60	0.98	19T	TENSILE STRENGTH	31	T6 74	LB/IN, PENDULUM TESTER
L267	Ø	5.62	6.83	-0.07	-0.01	0.62	19A	TENSILE STRENGTH	31	T6 74	LB/IN, LOAD CELL (CRE)
L278	Ø	5.64	6.86	-0.03	-0.01	0.64	19A	TENSILE STRENGTH	31	T6 74	LB/IN, LOAD CELL (CRE)
L207	Ø	5.64	6.69	-0.15	-0.12	0.91	19A	TENSILE STRENGTH	31	T6 74	LB/IN, LOAD CELL (CRE)
L182L	Ø	5.68	6.83	-0.03	-0.06	0.92	19T	TENSILE STRENGTH	31	T6 74	LB/IN, PENDULUM TESTER
L217A	Ø	5.71	6.99	0.11	0.04	1.01	19A	TENSILE STRENGTH	31	T6 74	LB/IN, LOAD CELL (CRE)
L264A	Ø	5.72	7.09	0.19	0.10	0.01	19A	TENSILE STRENGTH	31	T6 74	LB/IN, LOAD CELL (CRE)
L217P	Ø	5.73	6.80	-0.01	-0.11	0.07	19P	TENSILE STRENGTH	31	T6 74	LB/IN, PENDULUM TESTER
L606	Ø	5.73	6.58	0.12	0.01	1.04	19P	TENSILE STRENGTH	31	T6 74	LB/IN, PENDULUM TESTER
L237A	Ø	5.78	7.05	0.20	0.03	1.18	19Q	TENSILE STRENGTH	31	T6 74	LB/IN, PENDULUM TESTER
L676	Ø	5.78	7.05	0.21	0.03	1.44	19A	TENSILE STRENGTH	31	T6 74	LB/IN, LOAD CELL (CRE)
L684	Ø	5.79	6.68	-0.05	-0.24	2.19	19W	TENSILE STRENGTH	31	T6 74	LB/IN, LOAD CELL (CRE)
L652	Ø	5.80	6.65	-0.08	-0.27	0.95	19A	TENSILE STRENGTH	31	T6 74	LB/IN, LOAD CELL (CRE)
L265	Ø	5.81	6.90	0.12	-0.10	1.00	19A	TENSILE STRENGTH	31	T6 74	LB/IN, LOAD CELL (CRE)
L225	Ø	5.83	7.12	0.29	0.04	0.09	19P	TENSILE STRENGTH	31	T6 74	LB/IN, PENDULUM TESTER
L334	Ø	5.85	6.88	0.13	-0.14	0.00	19P	TENSILE STRENGTH	31	T6 74	LB/IN, PENDULUM TESTER
L554	Ø	5.89	7.09	0.31	-0.02	1.29	19A	TENSILE STRENGTH	31	T6 74	LB/IN, LOAD CELL (CRE)
L650	Ø	5.92	7.25	0.40	0.07	1.19	19G	TENSILE STRENGTH	31	T6 74	LB/IN, LOAD CELL (CRE)
L312	Ø	5.95	6.84	0.17	-0.24	0.94	19D	TENSILE STRENGTH	31	T6 74	LB/IN, LOAD CELL (CRE)
L281	Ø	5.95	7.19	0.42	-0.00	0.08	19G	TENSILE STRENGTH	31	T6 74	LB/IN, LOAD CELL (CRE)
L268A	Ø	5.96	7.09	0.30	-0.07	0.64	19A	TENSILE STRENGTH	31	T6 74	LB/IN, LOAD CELL (CRE)
L580	Ø	5.98	7.09	0.37	-0.09	0.94	19G	TENSILE STRENGTH	31	T6 74	LB/IN, LOAD CELL (CRE)
L157A	Ø	6.01	6.99	0.32	-0.18	0.72	19P	TENSILE STRENGTH	31	T6 74	LB/IN, PENDULUM TESTER
L151	Ø	6.02	7.37	0.00	0.08	1.00	19A	TENSILE STRENGTH	31	T6 74	LB/IN, LOAD CELL (CRE)
L568	Ø	6.05	7.05	0.39	-0.17	0.00	19P	TENSILE STRENGTH	31	T6 74	LB/IN, PENDULUM TESTER
L565	Ø	6.05	7.16	0.47	-0.09	0.00	19T	TENSILE STRENGTH	31	T6 74	LB/IN, PENDULUM TESTER
L264P	Ø	6.06	7.38	0.03	0.06	0.63	19P	TENSILE STRENGTH	31	T6 74	LB/IN, PENDULUM TESTER
L562	X	6.08	6.54	0.05	-0.55	0.70	19P	TENSILE STRENGTH	31	T6 74	LB/IN, PENDULUM TESTER
L167	*	6.11	7.67	0.88	0.23	0.96	19G	TENSILE STRENGTH	31	T6 74	LB/IN, LOAD CELL (CRE)
L737B	Ø	6.11	7.23	0.50	-0.08	0.92	19A	TENSILE STRENGTH	31	T6 74	LB/IN, LOAD CELL (CRE)
L305	Ø	6.15	7.27	0.02	-0.08	1.03	19P	TENSILE STRENGTH	31	T6 74	LB/IN, PENDULUM TESTER
L268P	X	6.45	6.63	0.37	-0.74	2.19	19P	TENSILE STRENGTH	31	T6 74	LB/IN, PENDULUM TESTER
L622	X	6.68	8.06	1.50	0.09	1.17	19G	TENSILE STRENGTH	31	T6 74	LB/IN, PENDULUM TESTER
L702	+	20.60	24.46	23.01	1.03	3.00	19X	TENSILE STRENGTH	31	T6 74	LB/IN: () PENDULUM, () LOAD CELL
L336	#	180.90	224.90	278.37	27.34	33.70	19G	TENSILE STRENGTH	31	T6 74	LB/IN, LOAD CELL (CRE)
GMEANS:		5.66	6.89			1.00					
		95% ELLIPSE:		1.02	0.34			WILD GAMMA = 45 DEGREES			

TENSILE STRENGTH, PACKAGING PAPERS

SAMPLE J02 = 5.66 KILONEWTN/M SAMPLE G17 = 6.89 KILONEWTN/M
 SAMPLE J02 = 32.3 LB/INCH SAMPLE G17 = 39.3 LB/INCH



TENSILE BREAKING STRENGTH, KILONEWTONS PER METER - PRIMARILY PRINTING PAPERS
TAPPI OFFICIAL TEST METHOD 1494 GS-70, CONSTANT RATE OF ELONGATION APPARATUS

LAB CODE	SAMPLE J72 76 GRAMS PER SQUARE METER					SAMPLE B95 90 GRAMS PER SQUARE METER					TEST D ₀ = 20		
	MEAN	DEV	NO. DEV	SDR	NO. SDR	MEAN	DEV	NO. DEV	SDR	NO. SDR	VAR	F	LAB
L105	3.77	.07	.43	.20	1.19	4.46	-.11	-.41	.39	1.74	20A	Ø	L105
L115	3.87	.17	.53	.17	1.02	4.82	.26	.99	.11	.49	20D	Ø	L115
L118	3.78	.08	.47	.08	.51	4.73	.16	.63	.13	.57	20A	Ø	L118
L122	3.69	-.01	-.04	.10	.59	4.45	-.12	-.45	.24	1.05	20A	Ø	L122
L124C	3.79	.09	.51	.22	1.37	4.76	.20	.76	.20	.86	20A	Ø	L124C
L125	3.84	.15	.54	.33	1.99	4.88	.32	1.22	.23	.99	20C	Ø	L125
L131	3.75	.05	.27	.13	.78	4.77	.21	.79	.15	.67	20E	Ø	L131
L141T	3.68	-.02	-.10	.10	.97	4.57	.00	.02	.17	.74	20A	Ø	L141T
L143	4.13	.43	2.43	.20	1.24	5.10	.53	2.04	.22	.96	20E	Ø	L143
L148	3.77	.07	.41	.10	.96	4.63	.07	.26	.24	1.07	20A	Ø	L148
L159	3.70	.09	.42	.14	.83	4.61	.05	.20	.22	.95	20A	Ø	L159
L163	3.69	-.01	-.03	.11	.69	4.53	-.03	-.12	.17	.74	20D	Ø	L163
L167	3.91	.22	1.24	.24	1.44	4.91	.35	1.33	.26	1.12	20G	Ø	L167
L176	3.37	-.53	-1.00	.19	1.19	4.08	-.49	-1.87	.30	1.33	20G	Ø	L176
L185	3.68	-.02	-.11	.20	1.19	4.78	.22	.83	.17	.74	20C	Ø	L185
L194	3.41	-.29	-1.00	.12	.70	4.23	-.33	-1.28	.14	.63	20A	Ø	L194
L211	3.35	-.33	-1.33	.29	1.20	3.85	-.71	-2.73	.40	1.77	20C	*	L211
L223B	3.70	.00	.00	.06	.49	4.52	-.04	-.16	.20	.87	20A	Ø	L223B
L226C	3.53	-.17	-.53	.10	.04	4.26	-.31	-1.18	.24	1.07	20C	Ø	L226C
L230	3.21	-.49	-2.79	.08	.49	3.88	-.68	-2.61	.12	.55	20G	*	L230
L243	3.66	-.04	-.24	.13	.78	4.52	-.04	-.16	.16	.69	20A	Ø	L243
L255	3.78	.08	.44	.12	.74	4.69	.12	.48	.22	.96	20A	Ø	L255
L260	3.58	-.12	-.50	.11	.64	4.57	.00	.02	.22	.96	20A	Ø	L260
L261	3.77	.07	.42	.20	1.24	4.58	.02	.07	.28	1.22	20A	Ø	L261
L291	3.50	-.20	-1.17	.28	1.09	3.69	-.68	-2.61	.44	1.92	20A	X	L291
L309	3.82	.12	.57	.20	1.20	4.71	.14	.55	.27	1.18	20E	Ø	L309
L315	3.59	-.11	-.54	.14	.83	4.47	-.09	-.36	.14	.62	20A	Ø	L315
L325	3.57	-.13	-.73	.10	.93	4.49	-.08	-.30	.18	.78	20E	Ø	L325
L328	.36	-3.34	-19.21	.02	.09	.45	-4.12	-15.83	.03	.11	20A	#	L328
L333	3.73	.03	.16	.12	.72	4.70	.13	.51	.15	.68	20A	Ø	L333
L344	3.94	.24	1.33	.17	1.01	4.70	.14	.53	.41	1.83	20A	Ø	L344
L356	3.62	-.03	-.44	.12	.75	4.45	-.11	-.43	.21	.94	20A	Ø	L356
L360	3.74	.04	.23	.23	1.33	4.54	-.02	-.09	.30	1.34	20B	Ø	L360
L386	3.92	.22	1.23	.24	1.40	4.90	.33	1.28	.25	1.08	20E	Ø	L386
L390	4.39	.69	3.33	.51	3.09	4.26	-.30	-1.17	.50	2.18	20A	X	L390
L442	3.55	-.14	-.53	.13	.78	4.38	-.18	-.69	.18	.77	20G	Ø	L442
L558	.72	-2.93	-17.14	.03	.16	.91	-3.66	-14.06	.04	.16	20A	#	L558
L563	3.78	.08	.44	.10	.98	4.69	.13	.49	.31	1.36	20A	Ø	L563
L574	3.77	.07	.42	.10	.82	4.79	.23	.88	.26	1.15	20A	Ø	L574
L575	3.76	.06	.32	.09	.54	4.62	.06	.22	.13	.55	20G	Ø	L575
L587	3.72	.02	.13	.13	.76	4.70	.14	.54	.17	.75	20A	Ø	L587
L592	3.47	-.23	-1.33	.18	1.10	4.39	-.18	-.68	.14	.60	20A	Ø	L592
L616	2.47	-1.23	-7.04	.33	1.99	2.30	-2.27	-8.71	.19	.85	20D	#	L616
L618	3.48	-.22	-1.23	.17	1.00	4.05	-.51	-1.96	.48	2.11	20A	Ø	L618
L692	3.62	-.08	-.47	.19	1.13	4.54	-.02	-.08	.19	.85	20A	Ø	L692
L698	3.91	.21	1.23	.16	1.10	4.74	.18	.67	.20	.87	20E	Ø	L698
L706	3.87	.17	.53	.34	2.08	4.54	-.03	-.10	.42	1.83	20E	Ø	L706
L732	3.83	.13	.73	.21	1.31	4.80	.24	.92	.19	.85	20A	Ø	L732
L734	1.67	-2.03	-11.00	.11	.65	1.99	-2.57	-9.88	.16	.69	20C	#	L734
L736	3.67	-.03	-.17	.14	.85	4.41	-.15	-.59	.32	1.43	20A	Ø	L736

GR₀ MEAN = 3.70 KILONEWTON/M

SD MEANS = .17 KILONEWTON/M

AVERAGE SDR = .10 KILONEWTON/M

GR₀ MEAN = 12.477 LB/15 MM

GRAND MEAN = 4.56 KILONEWTON/M

SD OF MEANS = .26 KILONEWTON/M

AVERAGE SDR = .23 KILONEWTON/M

GRAND MEAN = 15.353 LB/15 MM

TEST DETERMINATIONS = 20

44 LABS IN GRAND MEANS

AVERAGE SDR = .23 KILONEWTON/M

L139	3.66	-.04	-.23	.15	.90	4.62	.06	.23	.15	.64	20H	*	L139
L155	10.85	7.10	41.11	.37	2.27	12.87	8.31	31.93	.87	3.84	20X	*	L155
L250I	5.02	1.32	7.00	.12	.76	5.97	1.40	5.39	.27	1.21	20L	*	L250I
L251	3.13	-.57	-3.26	.23	1.37	3.79	-.77	-2.96	.32	1.40	20I	*	L251
L705	21.10	17.40	93.33	.78	4.73	25.61	21.05	80.91	1.96	8.64	20X	*	L705

L738 20.18 16.48 94.09 .81 4.95 25.10 20.54 78.93 .68 3.01 20X * L738

TOTAL NUMBER OF LABORATORIES REPORTING = 50

Best values: J72 3.7 ± 0.3 kilonewton per meter

B95 4.5 ± 0.4 kilonewton per meter

Data from the following laboratories appear to be
off by a multiplicative factor: 328, 558, 616 734.

ANALYSIS T20-1 TABLE 2

TENSILE BREAKING STRENGTH, KILONEWTONS PER METER - PRIMARILY PRINTING PAPERS
TAPPI OFFICIAL TEST METHOD T494 CS-70, CONSTANT RATE OF ELONGATION APPARATUS

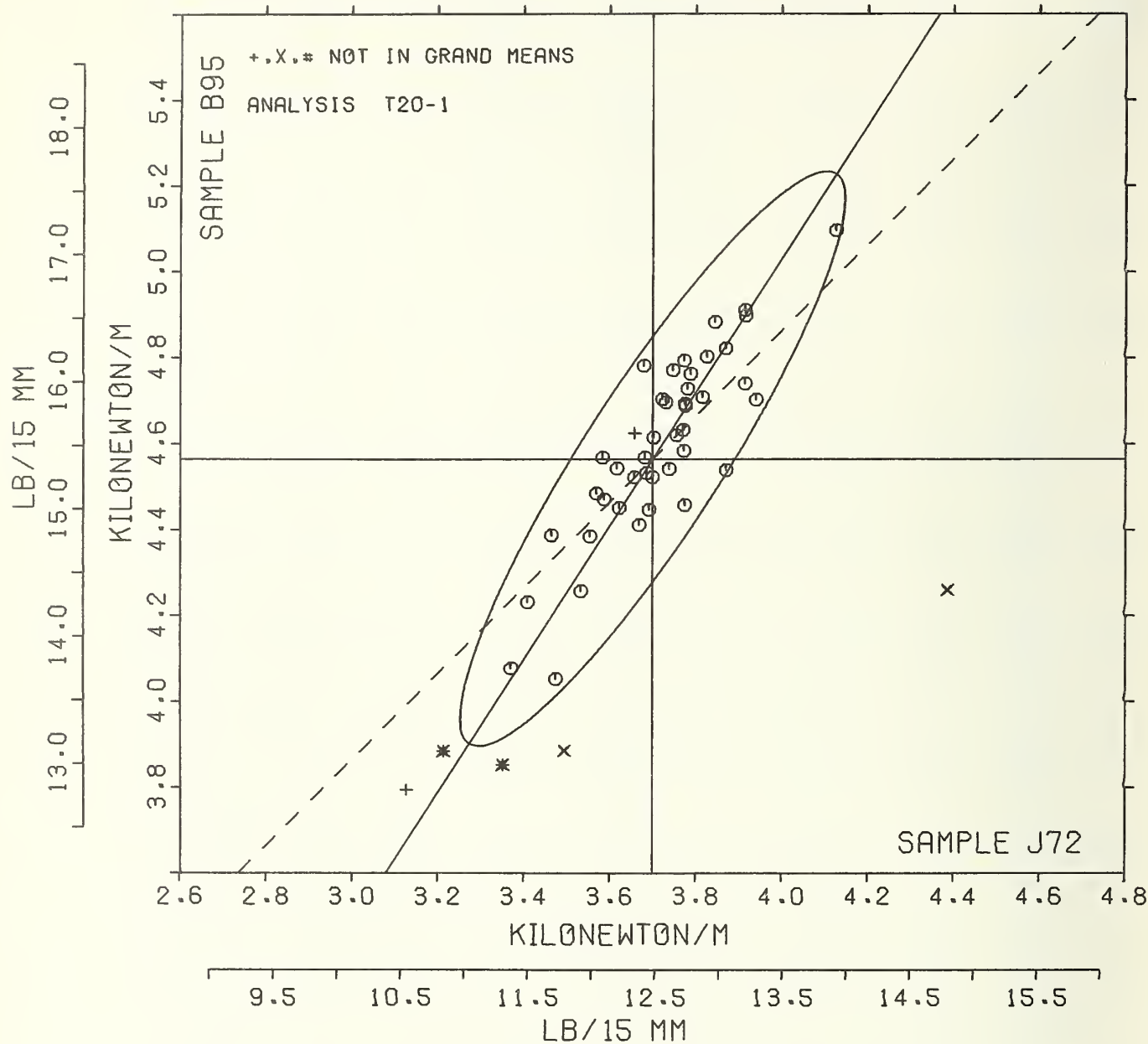
LAB CODE	F	MEANS		COORDINATES		AVG	PROPERTY---TEST INSTRUMENT---CONDITIONS			
		J72	B95	MAJOR	MINOR	Σ SUM	VAR			
L328	#	0.36	0.45	-0.27	0.59	0.40	20A	TENSILE STRENGTH,	14 T6 40 LB/IN,	LOAD CELL (CRE)
L558	#	0.72	0.91	-0.09	0.33	0.16	20A	TENSILE STRENGTH,	14 T6 40 LB/IN,	LOAD CELL (CRE)
L734	#	1.67	1.99	-0.20	0.32	0.67	20C	TENSILE STRENGTH,	14 T6 40 LB/IN,	LOAD CELL (CRE)
L616	#	2.47	2.30	-0.37	0.19	1.42	20D	TENSILE STRENGTH,	14 T6 40 LB/IN,	LOAD CELL (CRE)
L251	*	3.13	3.79	-0.50	0.06	1.39	20I	TENSILE STRENGTH,	14 T6 40 LB/IN,	CRE, 20 C, 65% RH
L230	*	3.21	3.88	-0.83	0.04	0.2	20D	TENSILE STRENGTH,	14 T6 40 LB/IN,	LOAD CELL (CRE)
L211	*	3.35	3.85	-0.79	0.09	1.48	20C	TENSILE STRENGTH,	14 T6 40 LB/IN,	LOAD CELL (CRE)
L176	0	3.37	4.08	-0.39	0.01	1.60	20G	TENSILE STRENGTH,	14 T6 40 LB/IN,	LOAD CELL (CRE)
L194	0	3.41	4.23	-0.44	0.06	0.9	20A	TENSILE STRENGTH,	14 T6 40 LB/IN,	LOAD CELL (CRE)
L592	0	3.47	4.39	-0.27	0.10	0.55	20A	TENSILE STRENGTH,	14 T6 40 LB/IN,	LOAD CELL (CRE)
L618	0	3.48	4.05	-0.55	0.09	1.58	20A	TENSILE STRENGTH,	14 T6 40 LB/IN,	LOAD CELL (CRE)
L291	X	3.50	3.89	-0.00	0.19	1.00	20A	TENSILE STRENGTH,	14 T6 40 LB/IN,	LOAD CELL (CRE)
L226C	0	3.53	4.26	-0.30	0.03	0.65	20C	TENSILE STRENGTH,	14 T6 40 LB/IN,	LOAD CELL (CRE)
L442	0	3.55	4.38	-0.23	0.02	0.78	20G	TENSILE STRENGTH,	14 T6 40 LB/IN,	LOAD CELL (CRE)
L325	0	3.57	4.49	-0.14	0.07	0.57	20B	TENSILE STRENGTH,	14 T6 40 LB/IN,	LOAD CELL (CRE)
L260	0	3.58	4.57	-0.00	0.10	0.40	20A	TENSILE STRENGTH,	14 T6 40 LB/IN,	LOAD CELL (CRE)
L315	0	3.59	4.47	-0.14	0.04	0.73	20A	TENSILE STRENGTH,	14 T6 40 LB/IN,	LOAD CELL (CRE)
L692	0	3.62	4.54	-0.00	0.06	0.59	20A	TENSILE STRENGTH,	14 T6 40 LB/IN,	LOAD CELL (CRE)
L356	0	3.62	4.45	-0.13	0.00	0.55	20A	TENSILE STRENGTH,	14 T6 40 LB/IN,	LOAD CELL (CRE)
L243	0	3.66	4.52	-0.00	0.01	0.74	20A	TENSILE STRENGTH,	14 T6 40 LB/IN,	LOAD CELL (CRE)
L139	*	3.60	4.62	0.03	0.07	0.77	20H	TENSILE STRENGTH,	14 T6 40 LB/IN,	CRE, SHORT TEST SPAN
L736	0	3.67	4.41	-0.14	0.00	1.64	20A	TENSILE STRENGTH,	14 T6 40 LB/IN,	LOAD CELL (CRE)
L185	0	3.68	4.78	0.17	0.13	0.57	20C	TENSILE STRENGTH,	14 T6 40 LB/IN,	LOAD CELL (CRE)
L141T	0	3.68	4.57	-0.01	0.02	0.55	20A	TENSILE STRENGTH,	14 T6 40 LB/IN,	LOAD CELL (CRE)
L163	0	3.69	4.53	-0.03	0.01	0.72	20D	TENSILE STRENGTH,	14 T6 40 LB/IN,	LOAD CELL (CRE)
L122	0	3.69	4.45	-0.10	0.06	0.62	20A	TENSILE STRENGTH,	14 T6 40 LB/IN,	LOAD CELL (CRE)
L223B	0	3.70	4.52	-0.03	0.02	0.68	20A	TENSILE STRENGTH,	14 T6 40 LB/IN,	LOAD CELL (CRE)
L159	0	3.70	4.61	0.04	0.02	0.69	20A	TENSILE STRENGTH,	14 T6 40 LB/IN,	LOAD CELL (CRE)
L587	0	3.72	4.70	0.13	0.06	0.76	20A	TENSILE STRENGTH,	14 T6 40 LB/IN,	LOAD CELL (CRE)
L333	0	3.73	4.70	0.13	0.05	0.70	20A	TENSILE STRENGTH,	14 T6 40 LB/IN,	LOAD CELL (CRE)
L360	0	3.74	4.54	0.00	0.05	1.43	20E	TENSILE STRENGTH,	14 T6 40 LB/IN,	LOAD CELL (CRE)
L131	0	3.75	4.77	0.20	0.07	0.73	20E	TENSILE STRENGTH,	14 T6 40 LB/IN,	LOAD CELL (CRE)
L575	0	3.76	4.62	0.08	0.02	0.55	20G	TENSILE STRENGTH,	14 T6 40 LB/IN,	LOAD CELL (CRE)
L148	0	3.77	4.63	0.10	0.02	1.01	20A	TENSILE STRENGTH,	14 T6 40 LB/IN,	LOAD CELL (CRE)
L261	0	3.77	4.58	0.00	0.05	1.43	20A	TENSILE STRENGTH,	14 T6 40 LB/IN,	LOAD CELL (CRE)
L574	0	3.77	4.79	0.23	0.06	0.68	20A	TENSILE STRENGTH,	14 T6 40 LB/IN,	LOAD CELL (CRE)
L105	0	3.77	4.46	-0.00	0.12	1.46	20A	TENSILE STRENGTH,	14 T6 40 LB/IN,	LOAD CELL (CRE)
L563	0	3.78	4.69	0.10	0.01	1.17	20A	TENSILE STRENGTH,	14 T6 40 LB/IN,	LOAD CELL (CRE)
L255	0	3.78	4.69	0.10	0.00	0.65	20A	TENSILE STRENGTH,	14 T6 40 LB/IN,	LOAD CELL (CRE)
L118	0	3.78	4.73	0.18	0.02	0.54	20A	TENSILE STRENGTH,	14 T6 40 LB/IN,	LOAD CELL (CRE)
L124C	0	3.79	4.76	0.22	0.03	1.44	20A	TENSILE STRENGTH,	14 T6 40 LB/IN,	LOAD CELL (CRE)
L309	0	3.82	4.71	0.18	0.02	1.19	20E	TENSILE STRENGTH,	14 T6 40 LB/IN,	LOAD CELL (CRE)
L732	0	3.83	4.80	0.27	0.02	1.08	20A	TENSILE STRENGTH,	14 T6 40 LB/IN,	LOAD CELL (CRE)
L125	0	3.84	4.88	0.30	0.05	1.49	20C	TENSILE STRENGTH,	14 T6 40 LB/IN,	LOAD CELL (CRE)
L115	0	3.87	4.82	0.31	0.00	0.75	20D	TENSILE STRENGTH,	14 T6 40 LB/IN,	LOAD CELL (CRE)
L706	0	3.87	4.54	0.07	0.16	1.55	20E	TENSILE STRENGTH,	14 T6 40 LB/IN,	LOAD CELL (CRE)
L698	0	3.91	4.74	0.40	0.09	0.58	20E	TENSILE STRENGTH,	14 T6 40 LB/IN,	LOAD CELL (CRE)
L167	0	3.91	4.91	0.41	0.01	1.25	20G	TENSILE STRENGTH,	14 T6 40 LB/IN,	LOAD CELL (CRE)
L386	0	3.92	4.90	0.40	0.00	1.47	20E	TENSILE STRENGTH,	14 T6 40 LB/IN,	LOAD CELL (CRE)
L344	0	3.94	4.70	0.40	0.13	1.42	20A	TENSILE STRENGTH,	14 T6 40 LB/IN,	LOAD CELL (CRE)
L143	0	4.13	5.10	0.00	0.07	1.40	20E	TENSILE STRENGTH,	14 T6 40 LB/IN,	LOAD CELL (CRE)
L390	X	4.39	4.26	0.11	0.74	2.04	20A	TENSILE STRENGTH,	14 T6 40 LB/IN,	LOAD CELL (CRE)
L2501	*	5.02	5.97	1.89	0.36	0.58	20L	TENSILE STRENGTH,	14 T6 40 LB/IN,	CRE, 20 C, 65% RH
L155	*	10.85	12.87	10.00	0.53	3.45	20X	TENSILE STRENGTH,	14 T6 40 LB/IN:	()PENDULUM,()LOAD CELL
L738	*	20.18	25.10	20.19	0.77	3.98	20X	TENSILE STRENGTH,	14 T6 40 LB/IN:	()PENDULUM,()LOAD CELL
L705	*	21.10	25.61	27.12	0.26	0.09	20X	TENSILE STRENGTH,	14 T6 40 LB/IN:	()PENDULUM,()LOAD CELL

GMEANS:

3.70 4.56
55% ELLIPSE;1.00
WITH GAMMA = 57 DEGREES

TENSILE STR., CRE. PRINTING PAPERS

SAMPLE J72 = 3.70 KILONEWTN/M SAMPLE B95 = 4.56 KILONEWTN/M
 SAMPLE J72 = 12.48 LB/15 MM SAMPLE B95 = 15.39 LB/15 MM

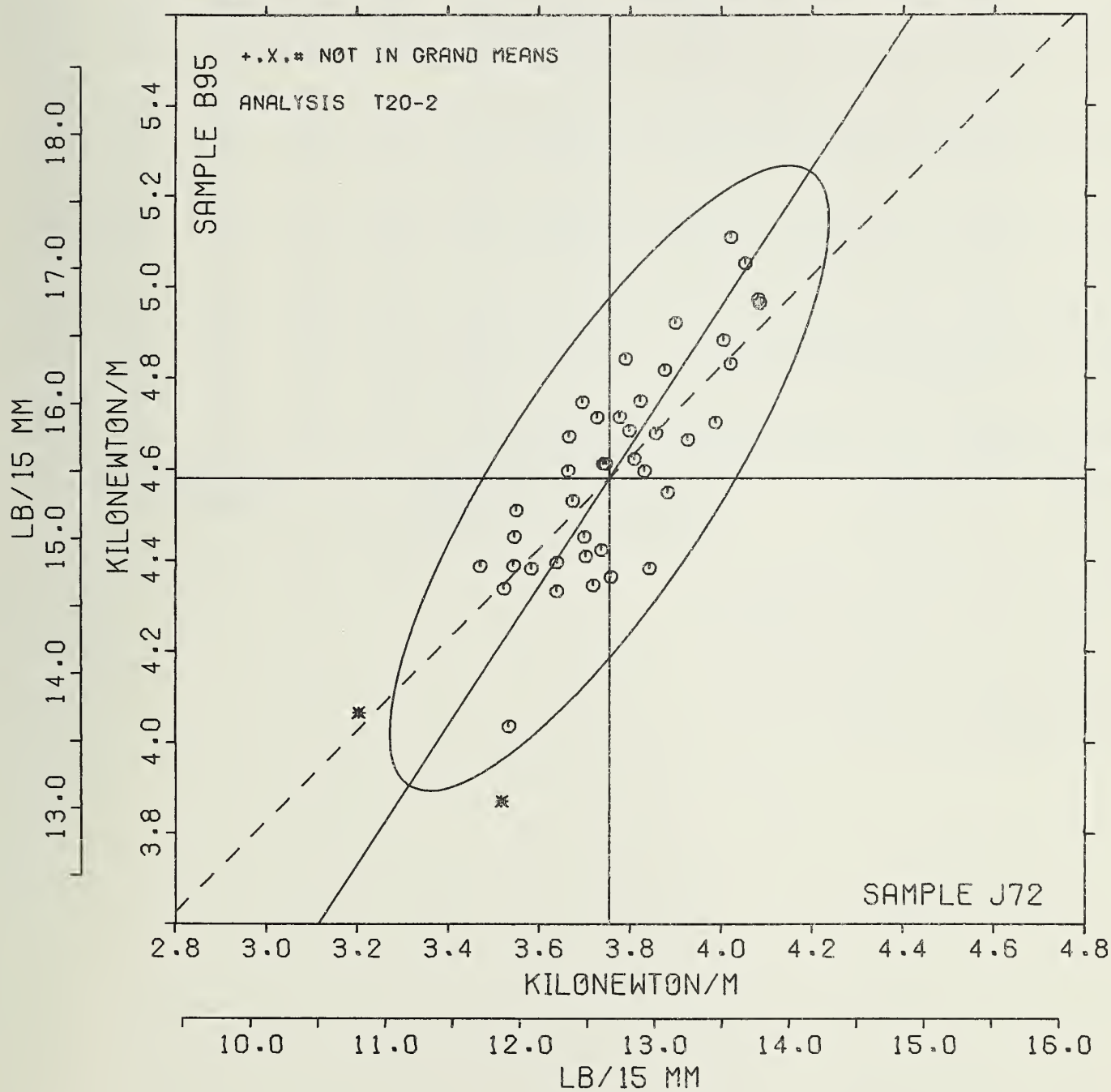


ANALYSIS T20-2 TABLE 2
 TENSILE BREAKING STRENGTH, MILLINEWTONS PER METER - PRIMARILY PRINTING PAPERS
 TAPPI OFFICIAL TEST METHOD T404 SS-76, PENDULUM-TYPE TESTER

LAB CODE	F	MEANS		COORDINATES		AVG		PROPERTY---TEST	INSTRUMENT---	CONDITIONS
		J72	B95	MAJOR	MINOR	X ₀	VAR			
L285	*	3.20	4.06	-0.73	0.18	1.045	20P	TENSILE STRENGTH	14 T6 40	LB/IN, PENDULUM TESTER
L313	0	3.47	4.39	-0.32	0.13	0.72	20T	TENSILE STRENGTH	14 T6 40	LB/IN, PENDULUM TESTER
L321	*	3.52	3.87	-0.72	-0.19	0.97	20Q	TENSILE STRENGTH	14 T6 40	LB/IN, PENDULUM TESTER
L213	0	3.52	4.34	-0.33	0.06	1.050	20T	TENSILE STRENGTH	14 T6 40	LB/IN, PENDULUM TESTER
L599	0	3.53	4.03	-0.55	-0.11	1.038	20V	TENSILE STRENGTH	14 T6 40	LB/IN, PENDULUM TESTER
L241	0	3.54	4.39	-0.28	0.07	0.91	20K	TENSILE STRENGTH	14 T6 40	LB/IN, PENDULUM TESTER
L242	0	3.55	4.45	-0.22	0.10	0.98	20Y	TENSILE STRENGTH	14 T6 40	LB/IN, PENDULUM TESTER
L356	0	3.55	4.51	-0.17	0.13	1.004	20P	TENSILE STRENGTH	14 T6 40	LB/IN, PENDULUM TESTER
L290	0	3.58	4.38	-0.20	0.03	1.050	20P	TENSILE STRENGTH	14 T6 40	LB/IN, PENDULUM TESTER
L195	0	3.64	4.40	-0.22	-0.00	1.027	20R	TENSILE STRENGTH	14 T6 40	LB/IN, PENDULUM TESTER
L685	0	3.64	4.33	-0.27	-0.04	0.74	20Y	TENSILE STRENGTH	14 T6 40	LB/IN, PENDULUM TESTER
L182L	0	3.66	4.60	-0.04	0.08	0.71	20T	TENSILE STRENGTH	14 T6 40	LB/IN, PENDULUM TESTER
L234	0	3.67	4.67	0.03	0.12	0.65	20P	TENSILE STRENGTH	14 T6 40	LB/IN, PENDULUM TESTER
L128	0	3.67	4.53	-0.08	0.04	0.82	20T	TENSILE STRENGTH	14 T6 40	LB/IN, PENDULUM TESTER
L262	0	3.70	4.75	0.11	0.14	0.71	20K	TENSILE STRENGTH	14 T6 40	LB/IN, PENDULUM TESTER
L212	0	3.70	4.45	-0.14	-0.02	0.98	20K	TENSILE STRENGTH	14 T6 40	LB/IN, PENDULUM TESTER
L148	0	3.70	4.41	-0.17	-0.05	0.83	20P	TENSILE STRENGTH	14 T6 40	LB/IN, PENDULUM TESTER
L680	0	3.72	4.35	-0.22	-0.10	1.045	20K	TENSILE STRENGTH	14 T6 40	LB/IN, PENDULUM TESTER
L275	0	3.73	4.71	0.10	0.09	1.008	20K	TENSILE STRENGTH	14 T6 40	LB/IN, PENDULUM TESTER
L233	0	3.74	4.42	-0.14	-0.07	1.029	20Q	TENSILE STRENGTH	14 T6 40	LB/IN, PENDULUM TESTER
L191P	0	3.74	4.61	0.02	0.03	0.65	20P	TENSILE STRENGTH	14 T6 40	LB/IN, PENDULUM TESTER
L249	0	3.75	4.61	0.02	0.02	0.90	20P	TENSILE STRENGTH	14 T6 40	LB/IN, PENDULUM TESTER
L183	0	3.76	4.36	-0.18	-0.12	1.003	20P	TENSILE STRENGTH	14 T6 40	LB/IN, PENDULUM TESTER
L218	0	3.78	4.71	0.13	0.05	0.75	20P	TENSILE STRENGTH	14 T6 40	LB/IN, PENDULUM TESTER
L728	0	3.79	4.84	0.24	0.11	0.95	20P	TENSILE STRENGTH	14 T6 40	LB/IN, PENDULUM TESTER
L162	0	3.80	4.68	0.11	0.02	0.66	20V	TENSILE STRENGTH	14 T6 40	LB/IN, PENDULUM TESTER
L311	0	3.81	4.62	0.07	-0.02	0.71	20V	TENSILE STRENGTH	14 T6 40	LB/IN, PENDULUM TESTER
L393	0	3.82	4.75	0.15	0.03	0.61	20P	TENSILE STRENGTH	14 T6 40	LB/IN, PENDULUM TESTER
L103	0	3.83	4.60	0.06	-0.06	0.77	20R	TENSILE STRENGTH	14 T6 40	LB/IN, PENDULUM TESTER
L121	0	3.84	4.38	-0.12	-0.18	0.82	20P	TENSILE STRENGTH	14 T6 40	LB/IN, PENDULUM TESTER
L124P	0	3.86	4.68	0.14	-0.03	0.94	20P	TENSILE STRENGTH	14 T6 40	LB/IN, PENDULUM TESTER
L626	0	3.88	4.82	0.27	0.03	0.79	20T	TENSILE STRENGTH	14 T6 40	LB/IN, PENDULUM TESTER
L556	0	3.88	4.55	0.04	-0.13	1.054	20P	TENSILE STRENGTH	14 T6 40	LB/IN, PENDULUM TESTER
L259	0	3.90	4.92	0.30	0.06	0.70	20P	TENSILE STRENGTH	14 T6 40	LB/IN, PENDULUM TESTER
L330	0	3.93	4.66	0.17	-0.10	1.050	20P	TENSILE STRENGTH	14 T6 40	LB/IN, PENDULUM TESTER
L714	0	3.99	4.70	0.23	-0.13	1.014	20P	TENSILE STRENGTH	14 T6 40	LB/IN, PENDULUM TESTER
L337	0	4.01	4.88	0.39	-0.05	0.95	20V	TENSILE STRENGTH	14 T6 40	LB/IN, PENDULUM TESTER
L571	0	4.02	4.83	0.30	-0.09	1.077	20P	TENSILE STRENGTH	14 T6 40	LB/IN, PENDULUM TESTER
L189	0	4.02	5.11	0.59	0.06	0.75	20K	TENSILE STRENGTH	14 T6 40	LB/IN, PENDULUM TESTER
L279P	0	4.05	5.05	0.56	0.01	1.004	20P	TENSILE STRENGTH	14 T6 40	LB/IN, PENDULUM TESTER
L625	0	4.08	4.97	0.51	-0.06	0.78	20P	TENSILE STRENGTH	14 T6 40	LB/IN, PENDULUM TESTER
L108	0	4.09	4.96	0.50	-0.07	0.97	20P	TENSILE STRENGTH	14 T6 40	LB/IN, PENDULUM TESTER
GMEANS:		3.75	4.58			1.000				
95% ELLIPSE:				0.81	0.24	WITH GAMMA = 56 DEGREES				

TENSILE STR., PENDULUM, PRINTING P.

SAMPLE J72 = 3.75 KILONEWTN/M SAMPLE B95 = 4.58 KILONEWTN/M
 SAMPLE J72 = 12.66 LB/15 MM SAMPLE B95 = 15.45 LB/15 MM



ANALYSIS T25-1 TABLE 1
TENSILE ENERGY ABSORPTION, JOULES PER SQUARE METER - PACKAGING PAPER
TAPPI OFFICIAL TEST METHOD T494 GS-79, CONSTANT RATE OF ELONGATION APPARATUS

LAB CODE	SAMPLE		BLEACHED				SAMPLE		BUFF MANILA				TEST D ₀ = 20		
	J02 MEAN	98 GRAMS DEV	N ₀ DEV	SDR	E ₀ SDR		G17 MEAN	118 GRAMS DEV	N ₀ DEV	SDR	E ₀ SDR		VAR	F	LAB
L106	79.3	-0.5	-0.00	14.7	1.59		79.2	3.6	0.50	8.7	0.95		25F	Ø	L106
L122	85.8	6.1	0.04	10.7	1.16		79.0	7.5	1.03	8.5	0.92		25P	Ø	L122
L126	78.5	-1.3	-0.14	0.3	0.67		68.5	-3.0	-0.42	8.1	0.88		25G	Ø	L126
L151	88.6	8.9	0.33	7.0	0.85		76.2	4.7	0.65	11.2	1.22		25F	Ø	L151
L182	73.8	-1.0	-0.10	8.1	0.87		60.1	-11.5	-1.58	9.3	1.01		25B	Ø	L182
L207	79.6	-0.2	-0.02	13.3	1.11		64.2	-7.4	-1.01	12.6	1.37		25F	Ø	L207
L234	95.8	16.0	1.09	6.2	0.67		82.2	10.7	1.47	8.6	0.93		25F	Ø	L234
L237B	67.3	-12.5	-1.32	12.4	1.33		71.4	-0.1	-0.02	10.0	1.08		25H	Ø	L237B
L243	80.0	0.3	0.03	5.8	0.63		66.5	-3.1	-0.42	5.7	0.62		25Z	Ø	L243
L264	73.8	-6.0	-0.03	3.9	0.42		64.6	-6.9	-0.95	8.7	0.94		25F	Ø	L264
L267	85.8	6.0	0.03	6.9	0.75		70.2	6.7	0.92	9.2	1.01		25F	Ø	L267
L268	91.1	11.3	1.19	7.4	0.80		78.6	7.0	0.97	8.5	0.93		25B	Ø	L268
L273	78.2	-1.6	-0.17	14.1	1.52		78.9	7.4	1.02	8.2	0.89		25F	Ø	L273
L278	83.1	3.3	0.33	7.4	0.80		71.4	-0.2	-0.02	11.3	1.23		25E	Ø	L278
L280	87.1	7.3	0.77	10.5	1.13		72.1	0.6	0.08	7.2	0.78		25B	Ø	L280
L312	88.2	8.4	0.33	9.4	1.01		77.4	5.9	0.81	10.2	1.11		25J	Ø	L312
L580	85.2	5.4	0.37	9.5	1.02		65.7	-5.8	-0.80	10.0	1.09		25C	Ø	L580
L604	109.5	29.3	3.13	11.4	1.23		114.1	42.5	5.86	22.7	2.47		25A	#	L604
L676	59.5	-20.3	-2.14	13.5	1.40		54.7	-16.8	-2.31	9.7	1.05		25F	Ø	L676
L689	63.0	-11.8	-1.02	8.0	0.80		63.8	-7.8	-1.07	8.1	0.88		25F	Ø	L689
L735	16.5	-63.3	-0.00	2.2	0.24		7.1	-64.5	-8.88	0.9	0.10		25F	#	L735
L737A	61.0	-18.3	-1.90	2.8	0.30		70.3	4.8	0.66	6.0	0.65		25E	*	L737A
L737B	80.7	0.9	0.10	12.5	1.35		75.3	3.8	0.52	10.2	1.11		25F	Ø	L737B
GR ₀ MEAN = 79.8 JOULES/SQ M GRAND MEAN = 71.5 JOULES/SQ M TEST DETERMINATIONS = 20															
SD MEANS = 9.5 JOULES/SQ M SD OF MEANS = 7.3 JOULES/SQ M 21 LABS IN GRAND MEANS															
AVERAGE SDR = 9.3 JOULES/SQ M AVERAGE SDR = 9.2 JOULES/SQ M															
GR ₀ MEAN = 5.465 FT ₀ LB/SQ FT GRAND MEAN = 4.901 FT ₀ LB/SQ FT															

L250 46.0 -33.8 -3.30 2.0 0.29 43.7 -27.9 -3.84 3.5 0.38 25N * L250
TOTAL NUMBER OF LABORATORIES REPORTING = 24

Best values: J02 80 $\pm$ 16 joules per square meter
G17 72 $\pm$ 10 joules per square meter

The following laboratories were omitted from the grand means because of extreme test results: 604.

Data from the following laboratories appear to be off by a multiplicative factor: 735

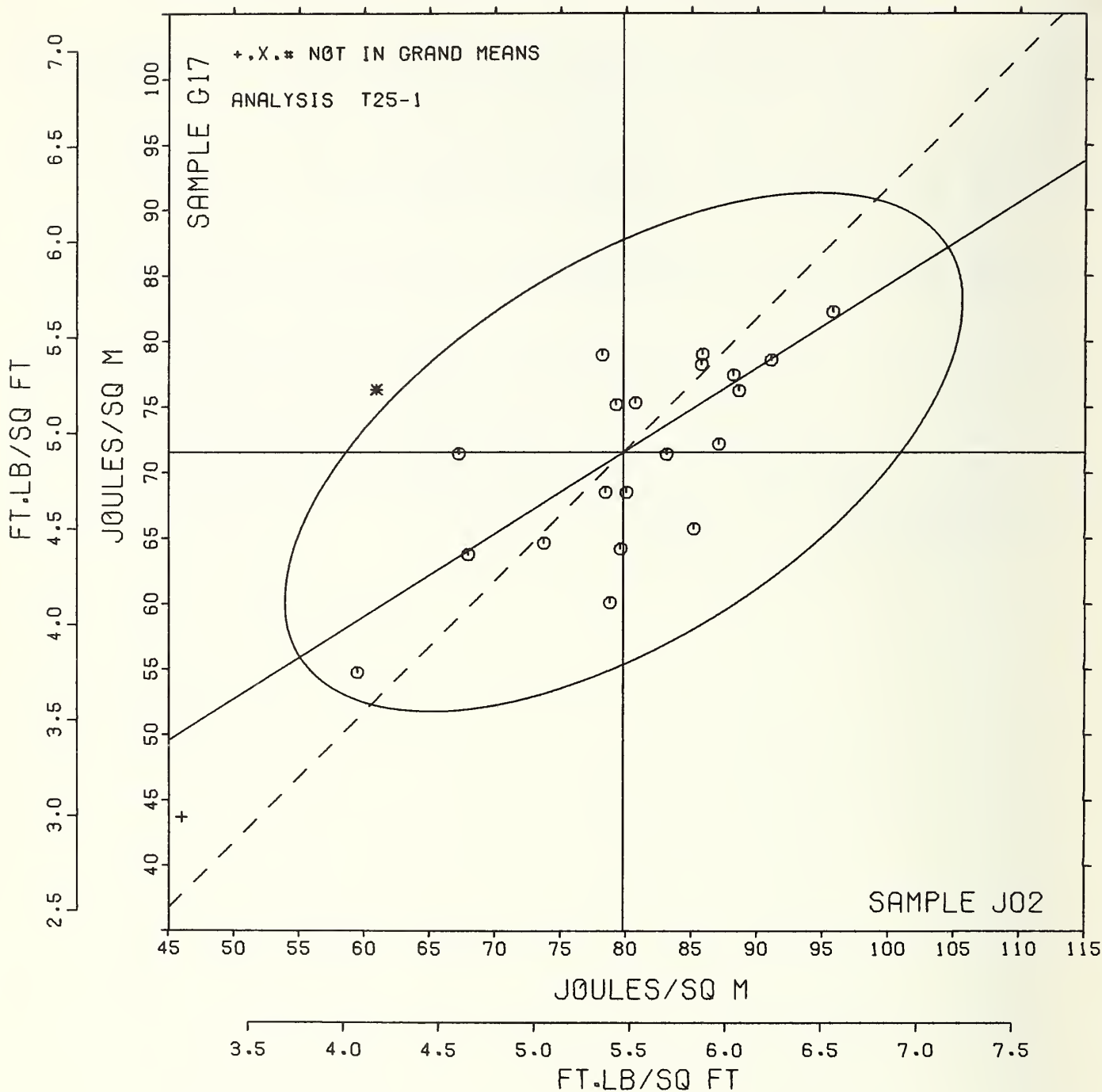
ANALYSIS T25-1 TABLE 2

TENSILE ENERGY ABSORPTION, JOULES PER SQUARE METER - PACKAGING PAPER
TAPPI OFFICIAL TEST METHOD T494 6S-70, CONSTANT RATE OF ELONGATION APPARATUS

LAB CODE	F	MEANS		COORDINATES		AVG		PROPERTY---	TEST INSTRUMENT---	CONDITIONS
		J02	G17	MAJOR	MINOR	MAJOR	VAR			
L735	#	16.3	7.1	-87.9	-26.7	0.17	25F	TENSILE ENERGY ABSORPTION (WITH TEST T19),	LINE/FLAT	JAWS
L250	*	46.0	43.7	-43.5	-5.5	0.33	25N	TENSILE ENERGY ABSORPTION (WITH TEST T19),	LINE/FLAT	JAWS, 20C
L676	0	59.5	54.7	-26.1	-3.4	1.25	25F	TENSILE ENERGY ABSORPTION (WITH TEST T19),	LINE/FLAT	JAWS
L737A	*	61.0	76.3	-13.4	14.1	0.48	25B	TENSILE ENERGY ABSORPTION (WITH TEST T19),	FLAT/FLAT	JAWS
L237B	0	67.3	71.4	-10.6	0.6	1.21	25M	TENSILE ENERGY ABSORPTION (WITH TEST T19),	2-PIN STRAIN GAGE	
L689	0	68.0	63.8	-14.1	-0.3	0.87	25F	TENSILE ENERGY ABSORPTION (WITH TEST T19),	LINE/FLAT	JAWS
L264	0	73.8	64.6	-8.8	-2.6	0.66	25F	TENSILE ENERGY ABSORPTION (WITH TEST T19),	LINE/FLAT	JAWS
L273	0	78.2	78.9	2.0	7.1	1.20	25F	TENSILE ENERGY ABSORPTION (WITH TEST T19),	LINE/FLAT	JAWS
L126	0	78.5	68.5	-2.7	-1.9	0.78	25G	TENSILE ENERGY ABSORPTION (WITH TEST T19),	LINE/LINE	JAWS
L182	0	78.8	60.1	-0.9	-9.2	0.34	25B	TENSILE ENERGY ABSORPTION (WITH TEST T19),	LINE/FLAT	JAWS
L106	0	79.3	75.2	1.5	3.3	1.27	25F	TENSILE ENERGY ABSORPTION (WITH TEST T19),	LINE/FLAT	JAWS
L207	0	79.6	64.2	-4.1	-6.1	1.24	25F	TENSILE ENERGY ABSORPTION (WITH TEST T19),	LINE/FLAT	JAWS
L243	0	80.0	68.5	-1.4	-2.7	0.62	25L	TENSILE ENERGY ABSORPTION (WITH TEST T19),	LINE/LINE	JAWS
L737B	0	80.7	75.3	2.8	2.7	1.23	25F	TENSILE ENERGY ABSORPTION (WITH TEST T19),	LINE/FLAT	JAWS
L278	0	83.1	71.4	2.7	-1.9	1.01	25E	TENSILE ENERGY ABSORPTION (WITH TEST T19),	FLAT/FLAT	JAWS
L580	0	85.2	65.7	1.5	-7.8	1.66	25C	TENSILE ENERGY ABSORPTION (WITH TEST T19),	LINE/LINE	JAWS
L267	0	85.8	78.2	8.0	2.4	0.68	25F	TENSILE ENERGY ABSORPTION (WITH TEST T19),	LINE/FLAT	JAWS
L122	0	85.8	79.0	9.1	3.1	1.04	25P	TENSILE ENERGY ABSORPTION (WITH TEST T19),	PATTERNED FLAT	JAW
L280	0	87.1	72.1	6.5	-3.4	0.36	25D	TENSILE ENERGY ABSORPTION (WITH TEST T19),	LINE/FLAT	JAWS
L312	0	88.2	77.4	10.3	0.5	1.06	25J	TENSILE ENERGY ABSORPTION (WITH TEST T19),	LINE/FLAT	JAWS
L151	0	88.6	76.2	10.0	-0.8	1.63	25F	TENSILE ENERGY ABSORPTION (WITH TEST T19),	LINE/FLAT	JAWS
L268	0	91.1	78.6	13.3	-0.1	0.66	25B	TENSILE ENERGY ABSORPTION (WITH TEST T19),	LINE/FLAT	JAWS
L234	0	95.8	82.2	19.2	0.5	0.60	25F	TENSILE ENERGY ABSORPTION (WITH TEST T19),	LINE/FLAT	JAWS
L604	#	109.5	114.1	47.9	20.1	1.65	25A	TENSILE ENERGY ABSORPTION (WITH TEST T19),	FLAT/FLAT	JAWS
GMEANS:		79.8	71.5			1.00				
		95% ELLIPSE:		29.2	14.3			W/IN GAMMA = 32 DEGREES		

T.E.A., PACKAGING PAPERS

SAMPLE J02 = 80. JOULES/SQ M SAMPLE G17 = 72. JOULES/SQ M
 SAMPLE J02 = 5.46 FT.LB/SQ FT SAMPLE G17 = 4.90 FT.LB/SQ FT



ANALYSIS T20-1 TABLE 1
TENSILE ENERGY ABSORPTION, JOULES PER SQUARE METER - PRINTING PAPER
TAPPI OFFICIAL TEST METHOD T494 6S-70, CONSTANT RATE OF ELONGATION APPARATUS

LAB CODE	PRINTING					HEAT-SET OFFSET BOOK					TEST D ₀ = 20		
	J72 MEAN	76 GRAMS DEV	76 GRAMS N ₀ DEV	SDR	R ₀ SDR	B95 MEAN	90 GRAMS DEV	90 GRAMS N ₀ DEV	SDR	R ₀ SDR	VAR	F	LAB
L115	42.0	-1.1	-0.24	4.4	0.83	44.0	0.5	0.13	3.4	0.62	26C	Ø	L115
L118	43.5	0.4	0.09	4.1	0.78	42.9	-0.7	-0.17	3.3	0.60	26E	Ø	L118
L122	46.4	3.3	0.09	3.7	0.70	42.7	-0.8	-0.21	6.7	1.22	26L	Ø	L122
L139	38.4	-4.7	-0.39	4.3	0.82	38.7	-4.9	-1.26	5.2	0.94	26H	Ø	L139
L159	45.3	2.1	0.43	3.4	1.02	43.2	-0.3	-0.08	6.9	1.25	26F	Ø	L159
L163	40.9	-2.3	-0.47	4.1	0.77	38.9	-4.7	-1.20	3.8	0.69	26J	Ø	L163
L167	39.1	-4.0	-0.04	2.4	0.44	49.1	5.6	1.43	2.6	0.46	26D	*	L167
L185	35.7	-7.4	-1.30	7.0	1.31	40.2	-3.3	-0.86	5.0	0.90	26C	Ø	L185
L211	40.3	-2.9	-0.01	11.1	2.07	43.4	-0.1	-0.04	5.7	1.04	26Z	Ø	L211
L255	49.5	6.3	1.03	4.3	0.80	48.3	4.8	1.24	6.2	1.13	26P	Ø	L255
L309	49.0	5.9	1.03	6.9	1.30	46.8	5.3	1.37	9.6	1.75	26J	Ø	L309
L356	47.5	4.4	0.92	3.8	1.10	45.3	1.7	0.44	5.8	1.05	26A	Ø	L356
L393	36.2	-6.9	-1.40	3.3	0.66	36.2	-7.3	-1.90	3.2	0.57	26V	Ø	L393
L442	44.5	1.4	0.29	3.7	0.70	43.8	0.3	0.08	4.4	0.79	26B	Ø	L442
L563	53.5	10.4	2.10	8.0	1.65	50.7	7.2	1.85	9.6	1.74	26C	Ø	L563
L575	42.9	-0.3	-0.03	2.0	0.52	41.1	-2.4	-0.63	2.7	0.49	26A	Ø	L575
L567	40.6	-2.3	-0.32	5.4	1.01	42.8	-0.7	-0.19	5.6	1.02	26C	Ø	L567
L592	41.0	-2.1	-0.44	3.2	0.97	43.6	0.0	0.01	6.5	1.19	26H	Ø	L592
GR ₀ MEAN = 43.1 JOULES/SQ M					GRAND MEAN = 43.5 JOULES/SQ M					TEST DETERMINATIONS = 20			
SD MEANS = 4.8 JOULES/SQ M					SD OF MEANS = 3.9 JOULES/SQ M					18 LABS IN GRAND MEANS			
AVERAGE SDR = 3.3 JOULES/SQ M					AVERAGE SDR = 5.5 JOULES/SQ M								
GR ₀ MEAN = 2.955 FT.LB/SQ FT					GRAND MEAN = 2.983 FT.LB/SQ FT								

L250 81.5 38.4 8.07 5.1 0.95 55.6 22.0 5.69 7.8 1.41 26N * L250
TOTAL NUMBER OF LABORATORIES REPORTING = 19

Best values: J72 43 ± 7 joules per square meter
B95 43 ± 6 joules per square meter

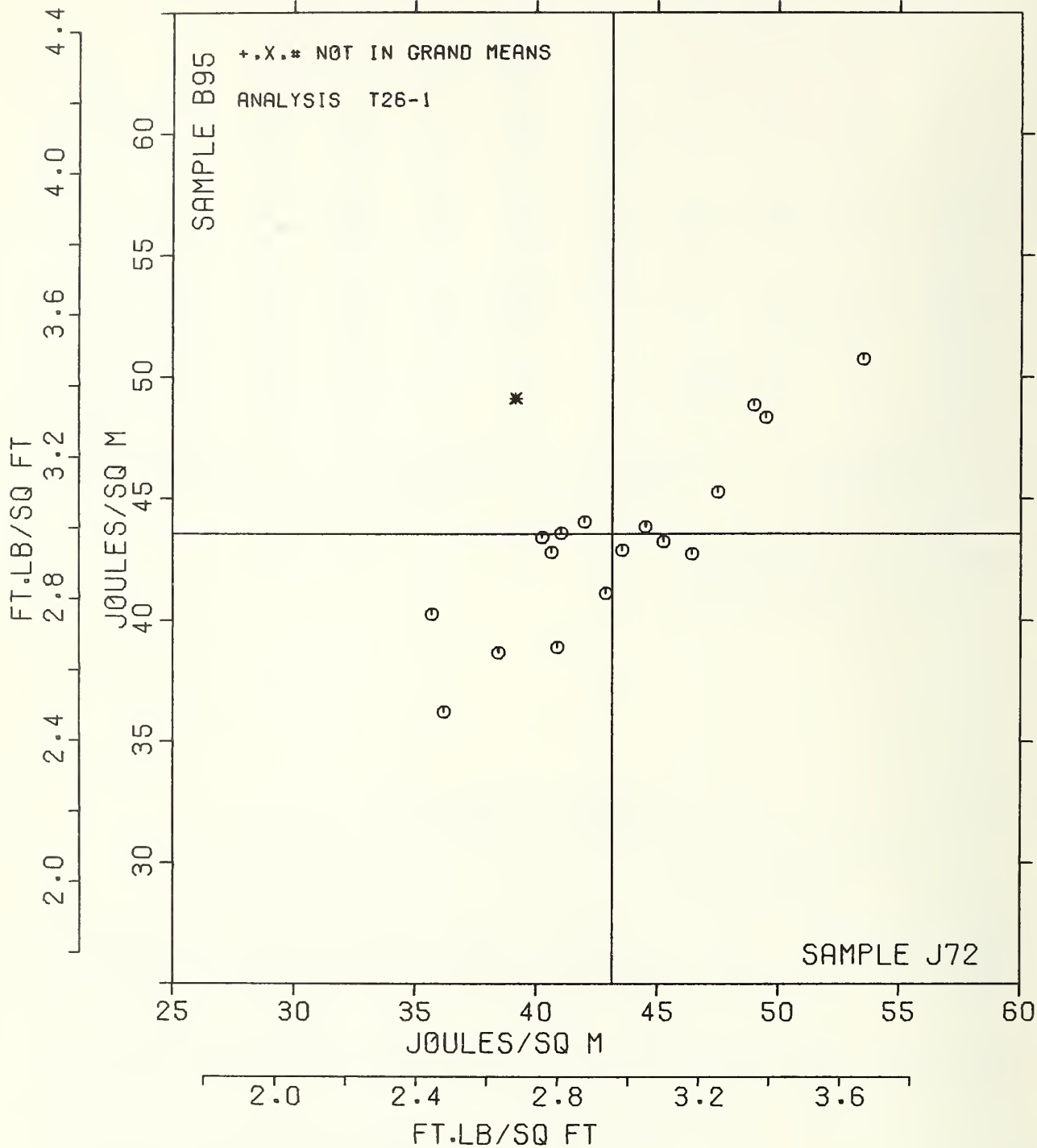
ANALYSIS T20-1 TABLE 2
TENSILE ENERGY ABSORPTION, JOULES PER SQUARE METER - PRINTING PAPER
TAPPI OFFICIAL TEST METHOD T494 6S-70, CONSTANT RATE OF ELONGATION APPARATUS

LAB CODE	F	MEANS		COORDINATES		AVG		PROPERTY---TEST INSTRUMENT---CONDITIONS											
		J72	B95	MAJOR	MINOR	K ₀	VAR												
L185	Ø	35.7	40.2	-7.9	1.8	1.11	26C	TENSILE ENERGY ABSORPTION (WITH TEST T20),	LINE/LINE JAWS										
L393	Ø	36.2	36.2	-10.0	-1.7	0.1	26V	TENSILE ENERGY ABSORPTION (WITH TEST T20),	LINE/FLAT JAWS										
L139	Ø	38.4	38.7	-0.7	-1.1	0.8	20d	TENSILE ENERGY ABSORPTION (WITH TEST T20),	2-PIN STRAIN GAGE										
L167	*	39.1	49.1	0.2	0.8	0.45	20d	TENSILE ENERGY ABSORPTION (WITH TEST T20),	2-PIN STRAIN GAGE										
L211	Ø	40.3	43.4	-2.4	1.6	1.05	26Z	TENSILE ENERGY ABSORPTION (WITH TEST T20),	LINE/LINE JAWS										
L567	Ø	40.6	42.8	-2.4	0.9	1.02	26C	TENSILE ENERGY ABSORPTION (WITH TEST T20),	LINE/LINE JAWS										
L163	Ø	40.9	38.9	-4.0	-2.4	0.73	26J	TENSILE ENERGY ABSORPTION (WITH TEST T20),	LINE/FLAT JAWS										
L592	Ø	41.0	43.6	-1.7	1.3	1.06	26H	TENSILE ENERGY ABSORPTION (WITH TEST T20),	2-PIN STRAIN GAGE										
L115	Ø	42.0	44.0	-0.6	1.1	0.73	26C	TENSILE ENERGY ABSORPTION (WITH TEST T20),	LINE/LINE JAWS										
L575	Ø	42.9	41.1	-1.7	-1.8	0.1	26A	TENSILE ENERGY ABSORPTION (WITH TEST T20),	FLAT/FLAT JAWS										
L118	Ø	43.5	42.9	-0.1	-0.8	0.09	26B	TENSILE ENERGY ABSORPTION (WITH TEST T20),	FLAT/FLAT JAWS										
L442	Ø	44.5	43.8	1.3	-0.0	0.74	26B	TENSILE ENERGY ABSORPTION (WITH TEST T20),	LINE/FLAT JAWS										
L159	Ø	45.3	43.2	1.0	-1.05	1.13	26F	TENSILE ENERGY ABSORPTION (WITH TEST T20),	LINE/FLAT JAWS										
L122	Ø	46.4	42.7	2.1	-2.6	0.0	26L	TENSILE ENERGY ABSORPTION (WITH TEST T20),	PATTERNED FLAT JAW										
L356	Ø	47.5	45.3	4.5	-1.3	1.07	26A	TENSILE ENERGY ABSORPTION (WITH TEST T20),	FLAT/FLAT JAWS										
L309	Ø	49.0	48.8	7.9	0.7	1.02	20J	TENSILE ENERGY ABSORPTION (WITH TEST T20),	LINE/FLAT JAWS										
L255	Ø	49.5	48.3	7.9	0.0	0.0	26P	TENSILE ENERGY ABSORPTION (WITH TEST T20),	PATTERNED FLAT JAW										
L563	Ø	53.5	50.7	12.0	-0.5	1.09	26C	TENSILE ENERGY ABSORPTION (WITH TEST T20),	LINE/LINE JAWS										
L250	*	81.5	65.6	43.9	-5.0	1.18	26N	TENSILE ENERGY ABSORPTION (WITH TEST T20),	LINE/FLAT JAWS, 20C										
GMEANS:		43.1	43.5			1.00													
		95% ELLIPSE:		15.9	0.1	WALK GAMMA = 37 DEGREES													

T.E.A., PRINTING PAPERS

SAMPLE J72 = 43. JOULES/SQ M SAMPLE B95 = 44. JOULES/SQ M

SAMPLE J72 = 2.95 FT.LB/SQ FT SAMPLE B95 = 2.98 FT.LB/SQ FT



ANALYSIS T28-1 TABLE 1
 ELONGATION TO BREAK, PERCENT - PACKAGING PAPER
 TAPPI OFFICIAL TEST METHODS T404 GS-76 AND T494 GS-70, PENDULUM AND CRE TYPES

LAB CODE	SAMPLE J02		BLEACHED 98 GRAMS PER SQUARE METER			SAMPLE G17		BUFF MANILA 118 GRAMS PER SQUARE METER			TEST D ₀ = 20		
	MEAN	DEV	N ₀ DEV	SDR	R ₀ SDR	MEAN	DEV	N ₀ DEV	SDR	R ₀ SDR	VAR	F	LAB
L106	2.330	.199	1.42	.287	1.73	1.900	.254	1.66	.117	.91	28B	Ø	L106
L122	2.261	.130	.93	.177	1.07	1.820	.175	1.14	.120	.93	28P	Ø	L122
L126	2.033	-.097	-.70	.114	.09	1.536	-.109	-.71	.113	.88	28C	Ø	L126
L151	2.100	-.031	-.22	.178	1.07	1.740	.094	.62	.196	1.52	28B	Ø	L151
L182	2.085	-.046	-.33	.093	.56	1.445	-.201	-1.31	.123	.96	28B	Ø	L182
L234	2.750	.619	4.43	.089	.54	2.220	.574	3.74	.120	.93	28B	#	L234
L243	2.107	-.024	-.17	.100	.64	1.542	-.104	-.68	.085	.66	28C	Ø	L243
L264	2.115	-.010	-.11	.103	.98	1.580	-.066	-.43	.151	1.17	28B	Ø	L264
L265	2.108	-.023	-.10	.153	.92	1.564	-.061	-.40	.121	.94	28A	Ø	L265
L267	2.320	.190	1.30	.106	.64	1.857	.212	1.38	.147	1.14	28B	Ø	L267
L268	2.233	.102	.73	.122	.74	1.783	.138	.90	.099	.76	28B	Ø	L268
L278	2.145	.014	.10	.110	.66	1.625	-.021	-.13	.145	1.12	28A	Ø	L278
L280	2.114	-.016	-.12	.203	1.22	1.599	-.047	-.30	.101	.78	28B	Ø	L280
L312	2.240	.109	.70	.157	.95	1.655	.209	1.36	.110	.85	28B	Ø	L312
L324	1.932	-.193	-1.42	.153	.92	1.442	-.203	-1.32	.127	.98	28P	Ø	L324
L336	2.072	-.058	-.42	.218	1.31	1.596	-.050	-.32	.133	1.03	28A	Ø	L336
L580	2.075	-.050	-.40	.165	.99	1.450	-.196	-1.28	.157	1.22	28C	Ø	L580
L581	1.556	-.574	-4.41	.188	1.13	1.537	-.108	-.71	.133	1.03	28A	#	L581
L676	1.885	-.246	-1.70	.287	1.73	1.530	-.116	-.75	.149	1.16	28B	Ø	L676
L689	1.945	-.180	-1.33	.101	.97	1.550	-.096	-.62	.147	1.14	28B	Ø	L689
L735	2.430	.299	2.14	.205	1.24	1.920	.274	1.79	.077	.60	28B	Ø	L735
L737A	2.230	.100	.71	.143	.86	1.626	-.019	-.12	.169	1.31	28A	Ø	L737A
L737B	1.985	-.146	-1.04	.182	1.10	1.575	-.070	-.46	.123	.96	28A	Ø	L737B

GR₀ MEAN = 2.131 PERCENT

SD MEANS = .140 PERCENT

GRAND MEAN = 1.646 PERCENT

SD OF MEANS = .153 PERCENT

TEST DETERMINATIONS = 20

21 LABS IN GRAND MEANS

AVERAGE SDR = .100 PERCENT

AVERAGE SDR = .129 PERCENT

L730	2.216	.085	.04	.203	1.22	1.654	.009	.06	.114	.88	28X	+	L730
L739	2.495	.364	2.01	.094	.57	1.780	.134	.88	.140	1.08	28X	+	L739

TOTAL NUMBER OF LABORATORIES REPORTING = 25

Best values: J02 2.1 + 0.2 percent

G17 1.6 ± 0.3 percent

The following laboratories were omitted from the
 grand means because of extreme test results: 234, 581.

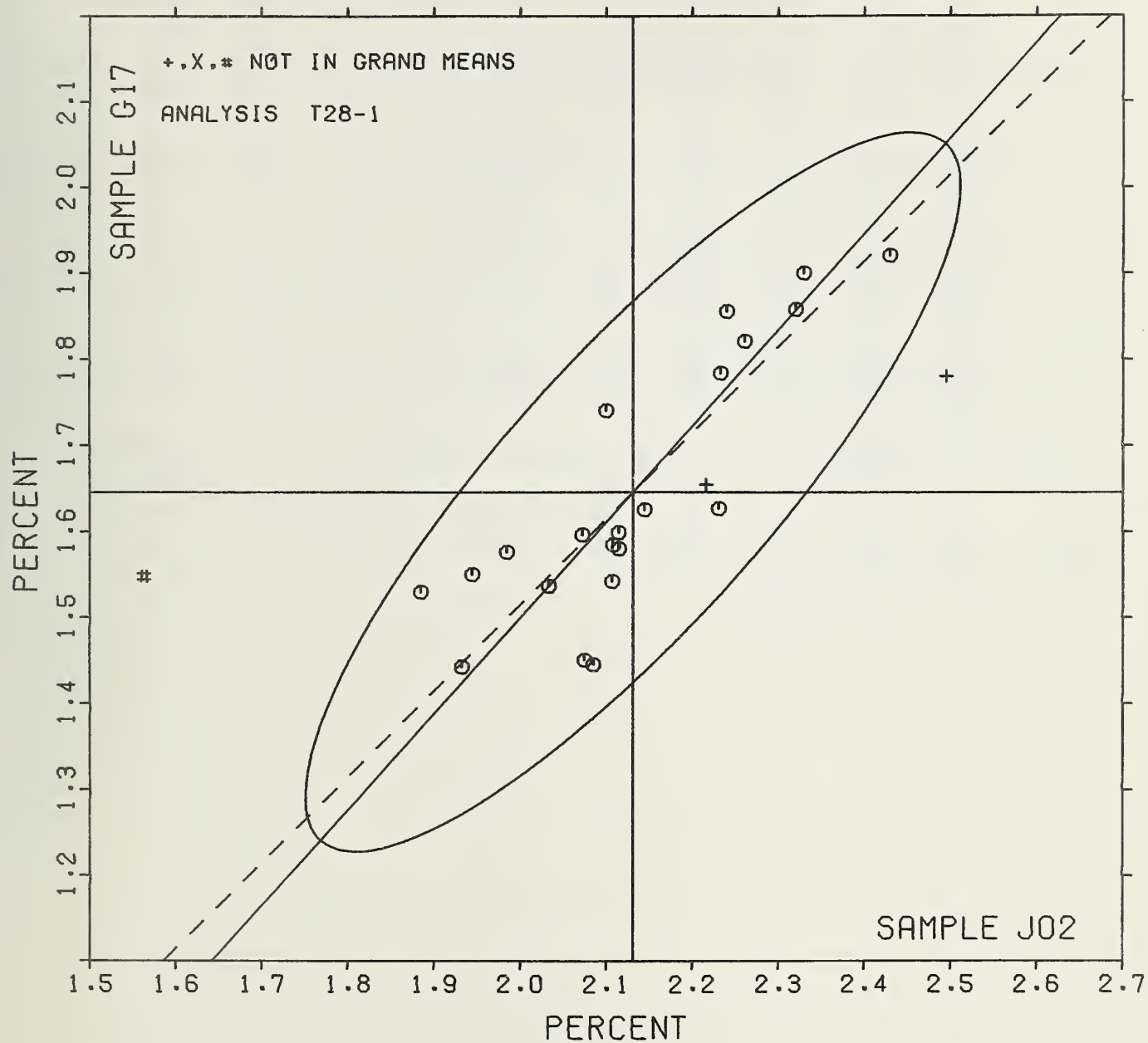
ANALYSIS T28-1 TABLE 2
 ELONGATION TO BREAK, PERCENT - PACKAGING PAPER
 TAPPI OFFICIAL TEST METHODS T404 CS-70 AND T494 CS-70, PENDULUM AND CRE TYPES

LAB CODE	F	MEANS		COORDINATES		AVG		PROPERTY---	TEST INSTRUMENT---	CONDITIONS
		J02	G17	MAJOR	MINOR	M. SD	VAR			
L581	#	1.556	1.537	-0.404	0.356	1.048	28A	ELONGATION (WITH TEST T19),	LOAD	CELL, FLAT/FLAT JAWS
L676	0	1.585	1.530	-0.250	0.106	1.044	28B	ELONGATION (WITH TEST T19),	LOAD	CELL, LINE/FLAT JAWS
L324	0	1.932	1.442	-0.254	0.012	0.95	28P	ELONGATION (WITH TEST T19),	LOAD	CELL, PATTERNED FLAT JAWS
L689	0	1.545	1.550	-0.195	0.075	1.005	28B	ELONGATION (WITH TEST T19),	LOAD	CELL, LINE/FLAT JAWS
L737B	0	1.585	1.575	-0.150	0.062	1.003	28A	ELONGATION (WITH TEST T19),	LOAD	CELL, FLAT/FLAT JAWS
L126	0	2.033	1.536	-0.145	-0.000	0.78	28C	ELONGATION (WITH TEST T19),	LOAD	CELL, LINE/LINE JAWS
L336	0	2.072	1.596	-0.076	0.010	1.017	28A	ELONGATION (WITH TEST T19),	LOAD	CELL, FLAT/FLAT JAWS
L580	0	2.075	1.450	-0.183	-0.089	1.11	28C	ELONGATION (WITH TEST T19),	LOAD	CELL, LINE/LINE JAWS
L182	0	2.085	1.445	-0.180	-0.100	0.76	28B	ELONGATION (WITH TEST T19),	LOAD	CELL, LINE/FLAT JAWS
L151	0	2.100	1.740	0.050	0.086	1.029	28B	ELONGATION (WITH TEST T19),	LOAD	CELL, LINE/FLAT JAWS
L243	0	2.107	1.542	-0.093	-0.051	0.63	28C	ELONGATION (WITH TEST T19),	LOAD	CELL, LINE/LINE JAWS
L265	0	2.108	1.584	-0.001	-0.024	0.93	28A	ELONGATION (WITH TEST T19),	LOAD	CELL, FLAT/FLAT JAWS
L280	0	2.114	1.599	-0.040	-0.019	1.00	28B	ELONGATION (WITH TEST T19),	LOAD	CELL, LINE/FLAT JAWS
L264	0	2.115	1.580	-0.039	-0.032	1.08	28B	ELONGATION (WITH TEST T19),	LOAD	CELL, LINE/FLAT JAWS
L278	0	2.145	1.625	-0.006	-0.024	0.69	28A	ELONGATION (WITH TEST T19),	LOAD	CELL, FLAT/FLAT JAWS
L730	+	2.216	1.654	0.063	-0.058	1.005	28X	ELONGATION (WITH TEST T19):	GIVE INSTRUMENT & JAW TYPES	
L737A	0	2.230	1.626	0.052	-0.087	1.009	28A	ELONGATION (WITH TEST T19),	LOAD	CELL, FLAT/FLAT JAWS
L268	0	2.233	1.783	0.171	0.016	0.75	28B	ELONGATION (WITH TEST T19),	LOAD	CELL, LINE/FLAT JAWS
L312	0	2.240	1.855	0.229	0.058	0.90	28B	ELONGATION (WITH TEST T19),	LOAD	CELL, LINE/FLAT JAWS
L122	0	2.261	1.820	0.217	0.020	1.00	28P	ELONGATION (WITH TEST T19),	LOAD	CELL, PATTERNED FLAT JAWS
L267	0	2.320	1.857	0.284	0.000	0.69	26B	ELONGATION (WITH TEST T19),	LOAD	CELL, LINE/FLAT JAWS
L106	0	2.330	1.900	0.322	0.021	1.032	28B	ELONGATION (WITH TEST T19),	LOAD	CELL, LINE/FLAT JAWS
L735	0	2.430	1.920	0.404	-0.040	0.92	28B	ELONGATION (WITH TEST T19),	LOAD	CELL, LINE/FLAT JAWS
L739	+	2.495	1.780	0.343	-0.182	0.83	28X	ELONGATION (WITH TEST T19):	GIVE INSTRUMENT & JAW TYPES	
L234	#	2.750	2.220	0.841	-0.078	0.73	28B	ELONGATION (WITH TEST T19),	LOAD	CELL, LINE/FLAT JAWS
GMEANS:		2.131	1.646			1.000				
		55% ELLIPSE:		0.543	0.155			WITH GAMMA = 48 DEGREES		

ELONGATION TO BREAK, PACKAGING PAPER

SAMPLE J02 = 2.13 PERCENT

SAMPLE G17 = 1.65 PERCENT



ANALYSIS T29-1 TABLE 1
 ELONGATION TO BREAK, PERCENT - PRINTING PAPER
 TAPPI OFFICIAL TEST METHODS T404 GS-76 AND T494 GS-70, PENDULUM AND CRE TYPES

LAB CODE	SAMPLE J72		PRINTING 76 GRAMS PER SQUARE METER				SAMPLE B95		HEAT-SET OFFSET BOOK 90 GRAMS PER SQUARE METER				TEST D ₀ = 20		
	MEAN	DEV	N ₀ DEV	SDR	R ₀ SDR		MEAN	DEV	N ₀ DEV	SDR	R ₀ SDR		VAR	F	LAB
L105	1.0387	-.0302	-1.031	.0151	1.000		1.0075	-.0360	-1.065	.0183	1.031		29A	Ø	L105
L118	1.0735	.0045	.020	.0111	.074		1.0464	.0029	.013	.0086	.062		29A	Ø	L118
L122	1.0872	.0182	.079	.0124	.082		1.0482	.0047	.021	.0134	.096		29P	Ø	L122
L139	1.0415	-.0275	-1.019	.0131	.087		1.0120	-.0315	-1.044	.0132	.095		29D	Ø	L139
L141T	1.0444	-.0246	-1.000	.0189	1.025		1.0275	-.0160	-.073	.0118	.085		29D	Ø	L141T
L163	1.0773	.0083	.030	.0133	.088		1.0478	.0043	.020	.0112	.080		29B	Ø	L163
L176	1.0769	.0079	.034	.0200	1.033		1.0433	-.0002	-.001	.0223	1.060		29B	Ø	L176
L185	1.0549	-.0140	-.001	.0185	1.022		1.0433	-.0002	-.001	.0126	.090		29C	Ø	L185
L255	2.0261	.0571	2.040	.0125	.083		1.0941	.0506	2.031	.0171	1.022		29P	Ø	L255
L309	1.0960	.0271	1.017	.0201	1.033		1.0702	.0267	1.022	.0201	1.044		29A	Ø	L309
L344	1.0517	-.0172	-.075	.0149	.099		1.0242	-.0193	-.088	.0151	1.008		29A	Ø	L344
L356	1.0920	.0231	1.000	.0158	1.004		1.0571	.0136	.062	.0136	.098		29A	Ø	L356
L386	1.0305	-.0385	-1.007	.0147	.097		1.0135	-.0300	-1.037	.0088	.063		29A	Ø	L386
L442	1.0820	.0130	.007	.0115	.076		1.0515	.0080	.036	.0099	.071		29B	Ø	L442
L575	1.0700	.0011	.005	.0077	.051		1.0388	-.0047	-.021	.0053	.038		29A	Ø	L575
L587	1.0685	-.0005	-.002	.0140	.097		1.0660	.0225	1.003	.0164	1.017		29C	Ø	L587
L592	1.0676	-.0014	-.000	.0240	1.059		1.0611	.0176	.081	.0187	1.033		29D	Ø	L592
L698	1.0735	.0045	.020	.0179	1.018		1.0490	.0055	.025	.0133	.095		29C	Ø	L698
L736	1.0575	-.0115	-.050	.0107	.071		1.0250	-.0185	-.085	.0157	1.013		29A	Ø	L736

GR₀ MEAN = 1.0690 PERCENT

SD MEANS = .0231 PERCENT

GRAND MEAN = 1.0435 PERCENT

SD OF MEANS = .0219 PERCENT

AVERAGE SDR = .0151 PERCENT

AVERAGE SDR = .0140 PERCENT

TEST DETERMINATIONS = 20

19 LABS IN GRAND MEANS

L242	2.0205	.0515	2.020	.0147	.097		1.0860	.0425	1.094	.0147	1.005		29R	+	L242
L626	1.0550	-.0140	-.000	.0100	.066		1.0317	-.0118	-.054	.0099	.071		29R	+	L626
L685	1.0680	-.0010	-.004	.0120	.079		1.0380	-.0055	-.025	.0111	.079		29R	+	L685

TOTAL NUMBER OF LABORATORIES REPORTING = 22

Best values: J72 1.7 ± 0.3 percent

B95 1.5 ± 0.4 percent

ANALYSIS T29-1 TABLE 2

ELONGATION TO BREAK, PERCENT - PRINTING PAPER

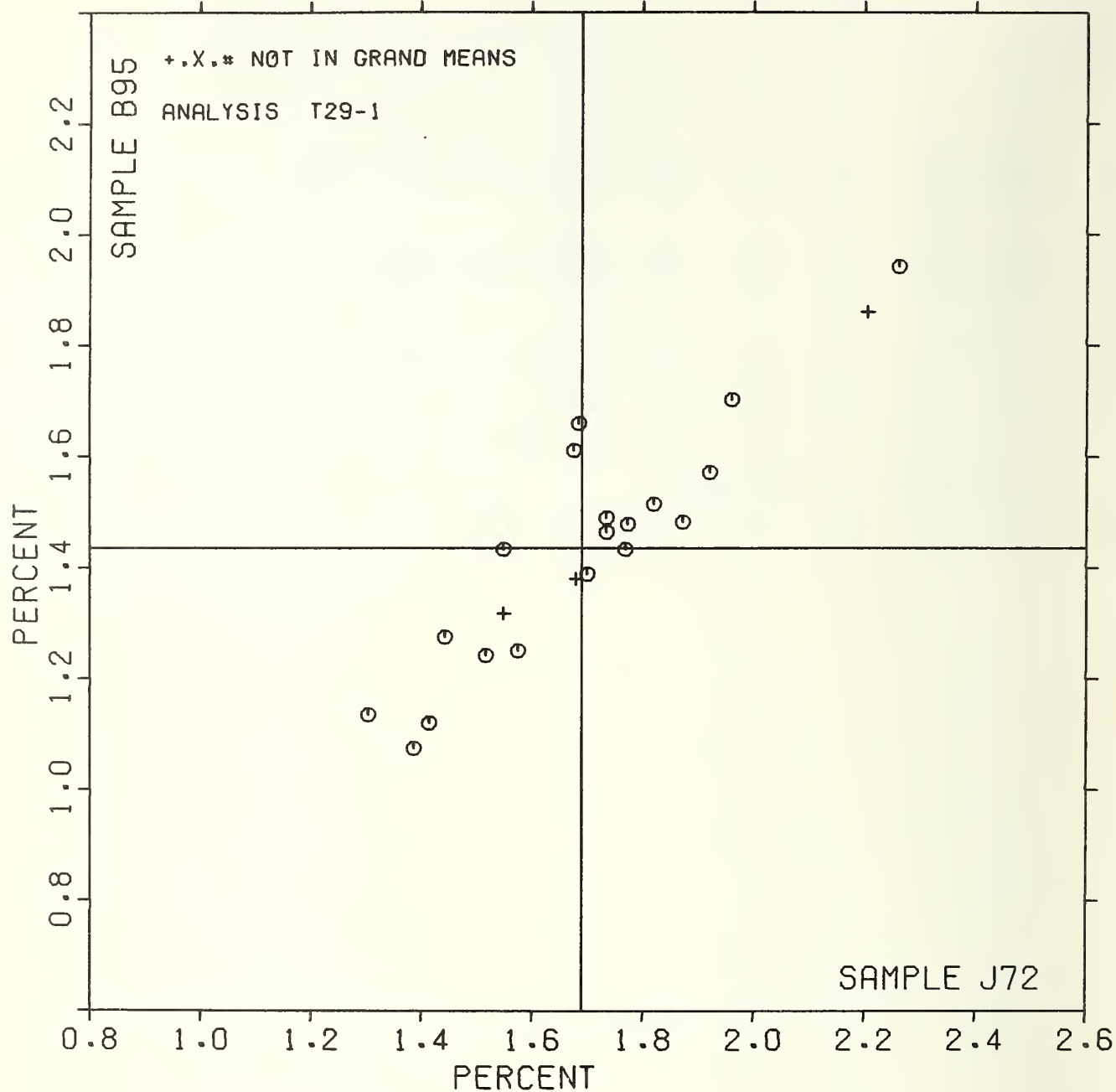
TAPPI OFFICIAL TEST METHODS T404 6S-76 AND T494 6S-70, PENDULUM AND CRE TYPES

LAB CODE	F	MEANS		COORDINATES		AVG		PROPERTY---	TEST INSTRUMENT---	CONDITIONS
		J72	B95	MAJOR	MINOR	X ₀	SDX			
L386	Ø	1.305	1.135	-.480	-.045	.86	29A	ELONGATION	(WITH TEST T20),	LOAD CELL, FLAT/FLAT JAWS
L105	Ø	1.387	1.075	-.407	-.055	1.16	29A	ELONGATION	(WITH TEST T20),	LOAD CELL, FLAT/FLAT JAWS
L139	Ø	1.415	1.120	-.410	-.041	.91	29D	ELONGATION	(WITH TEST T20),	LOAD CELL, 2-PIN STRAIN GAGE
L141T	Ø	1.444	1.275	-.288	-.052	1.05	29D	ELONGATION	(WITH TEST T20),	LOAD CELL, 2-PIN STRAIN GAGE
L344	Ø	1.517	1.242	-.258	-.023	1.03	29A	ELONGATION	(WITH TEST T20),	LOAD CELL, FLAT/FLAT JAWS
L185	Ø	1.549	1.433	-.103	-.095	1.66	29C	ELONGATION	(WITH TEST T20),	LOAD CELL, LINE/LINE JAWS
L626	+	1.550	1.317	-.182	-.010	.69	29X	ELONGATION	(WITH TEST T20),	PENDULUM, FLAT/FLAT JAWS
L736	Ø	1.575	1.250	-.210	-.050	.92	29A	ELONGATION	(WITH TEST T20),	LOAD CELL, FLAT/FLAT JAWS
L592	Ø	1.670	1.611	.111	.138	1.46	29D	ELONGATION	(WITH TEST T20),	LOAD CELL, 2-PIN STRAIN GAGE
L685	+	1.680	1.380	-.045	-.034	.79	29R	ELONGATION	(WITH TEST T20),	PENDULUM, FLAT/FLAT JAWS
L587	Ø	1.685	1.660	.151	.167	1.07	29C	ELONGATION	(WITH TEST T20),	LOAD CELL, LINE/LINE JAWS
L575	Ø	1.700	1.388	-.024	-.042	.45	29A	ELONGATION	(WITH TEST T20),	LOAD CELL, FLAT/FLAT JAWS
L698	Ø	1.735	1.490	.071	.009	1.07	29C	ELONGATION	(WITH TEST T20),	LOAD CELL, LINE/LINE JAWS
L118	Ø	1.735	1.464	.053	-.010	.86	29A	ELONGATION	(WITH TEST T20),	LOAD CELL, FLAT/FLAT JAWS
L176	Ø	1.769	1.433	.057	-.056	1.46	29B	ELONGATION	(WITH TEST T20),	LOAD CELL, LINE/FLAT JAWS
L163	Ø	1.773	1.478	.090	-.026	.64	29B	ELONGATION	(WITH TEST T20),	LOAD CELL, LINE/FLAT JAWS
L442	Ø	1.820	1.515	.150	-.031	.73	29B	ELONGATION	(WITH TEST T20),	LOAD CELL, LINE/FLAT JAWS
L122	Ø	1.872	1.482	.165	-.091	.89	29F	ELONGATION	(WITH TEST T20),	LOAD CELL, PATTERNED FLAT JAWS
L356	Ø	1.920	1.571	.262	-.059	1.01	29A	ELONGATION	(WITH TEST T20),	LOAD CELL, FLAT/FLAT JAWS
L309	Ø	1.960	1.702	.380	.009	1.58	29A	ELONGATION	(WITH TEST T20),	LOAD CELL, FLAT/FLAT JAWS
L242	+	2.205	1.860	.666	-.644	1.01	29R	ELONGATION	(WITH TEST T20),	PENDULUM, FLAT/FLAT JAWS
L255	Ø	2.261	1.941	.763	-.024	1.02	29P	ELONGATION	(WITH TEST T20),	LOAD CELL, PATTERNED FLAT JAWS
GMEANS:		1.690	1.435			1.00				
		95% ELLIPSE:		.855	.193	WITH GAMMA = 43 DEGREES				

ELONGATION TO BREAK, PRINTING PAPER

SAMPLE J72 = 1.69 PERCENT

SAMPLE B95 = 1.44 PERCENT



TAPPI COLLABORATIVE REFERENCE PROGRAM
ANALYSIS T30-1 TABLE 1
FOLDING ENDURANCE (MIT), DOUBLE FOLDS
TAPPI SUGGESTED METHOD T511 SU-69

NOVEMBER 1979

LAB CODE	SAMPLE B30		B30A PAPER 77 GRAMS PER SQUARE METER				SAMPLE B80		COATED OFFSET BOOK 75 GRAMS PER SQUARE METER				TEST D ₀ = 15		
	MEAN	DEV	N ₀ DEV	SDR	R ₀ SDR		MEAN	DEV	N ₀ DEV	SDR	R ₀ SDR		VAR	F	LAB
L105	13.3	-3.5	-1.21	2.3	.43		37.5	-10.0	-0.66	15.4	.88		30M	0	L105
L118	18.1	1.2	.43	4.7	.89		38.3	-9.2	-0.60	11.8	.68		30D	0	L118
L121	10.7	-0.2	-0.00	6.0	1.12		66.4	12.9	.84	27.6	1.58		30M	0	L121
L122	21.3	4.4	1.53	6.3	1.18		167.0	59.5	3.89	56.4	3.23		30M	X	L122
L124	19.7	2.8	.98	5.2	.98		53.6	6.1	.40	13.0	.74		30N	0	L124
L150	19.3	2.4	.54	6.7	1.27		61.7	14.2	.93	15.0	.86		30M	0	L150
L158	12.3	-4.6	-1.58	2.8	.52		21.8	-25.7	-1.68	10.1	.58		30N	0	L158
L159	18.7	1.8	.63	3.9	.73		50.9	3.4	.22	15.1	.86		30N	0	L159
L162	15.7	-1.2	-0.40	4.1	.77		42.8	-4.7	-0.31	21.2	1.21		30M	0	L162
L163	16.3	-0.5	-0.17	4.4	.82		44.4	-3.1	-0.20	15.3	.87		30N	0	L163
L176	34.7	17.8	0.10	12.8	2.41		137.2	89.7	5.87	70.6	4.04		30N	#	L176
L182M	24.4	7.0	2.01	4.5	.84		69.6	22.1	1.45	12.0	.69		30M	*	L182M
L185	20.5	3.0	1.23	6.0	1.13		77.5	30.0	1.96	22.2	1.27		30N	0	L185
L190C	17.7	.9	.31	7.3	1.36		45.7	-1.8	-0.12	13.1	.75		30N	0	L190C
L212	18.1	1.3	.43	4.7	.89		48.3	.8	.05	18.2	1.04		30M	0	L212
L223F	19.7	2.8	.98	5.2	.98		45.1	-2.4	-0.15	14.4	.83		30M	0	L223F
L230	14.1	-2.7	-0.93	4.8	.90		52.9	5.4	.35	16.1	.92		30N	0	L230
L238A	16.3	-0.5	-0.17	4.5	.84		50.6	3.1	.20	16.8	.96		30N	0	L238A
L238B	11.7	-5.2	-1.70	4.4	.83		18.7	-28.8	-1.89	9.8	.56		30D	0	L238B
L243	19.0	2.2	.73	7.3	1.38		52.2	4.7	.31	25.7	1.47		30D	0	L243
L254	18.9	2.0	.70	7.0	1.31		60.6	33.1	2.16	38.8	2.22		30M	0	L254
L262	17.1	.3	.10	6.4	1.20		55.7	8.2	.54	21.0	1.20		30N	0	L262
L275	17.2	.4	.13	5.0	1.06		27.8	-19.7	-1.29	11.2	.64		30N	0	L275
L278	15.5	-1.3	-0.43	6.0	1.25		23.9	-23.6	-1.55	12.0	.69		30C	0	L278
L279	18.0	1.2	.40	5.3	.99		58.9	11.4	.74	18.7	1.07		30N	0	L279
L285A	15.6	-1.2	-0.43	7.3	1.37		38.5	-9.0	-0.59	20.5	1.18		30N	0	L285A
L285B	38.9	22.0	7.01	18.0	3.50		23.9	-23.6	-1.55	6.5	.37		30N	#	L285B
L320	19.3	2.5	.80	6.2	1.17		50.3	2.8	.19	21.6	1.24		30N	0	L320
L321	13.3	1.4	.49	6.2	1.17		54.4	6.9	.45	28.6	1.64		30M	0	L321
L326N	14.8	-2.0	-0.70	6.7	1.26		23.3	-24.2	-1.58	11.9	.68		30N	0	L326N
L339	12.7	-4.2	-1.44	4.0	.70		26.4	-21.1	-1.38	11.1	.64		30M	0	L339
L376	15.9	-2.9	-1.00	3.4	.64		38.4	-11.1	-0.73	20.7	1.19		30N	0	L376
L388	16.1	-0.7	-0.24	5.8	1.09		55.3	7.8	.51	20.9	1.20		30N	0	L388
L390	14.9	-1.9	-0.60	5.2	.98		33.1	-14.4	-0.94	17.0	.98		30N	0	L390
L393	16.3	-0.0	-0.20	4.9	.92		47.2	-0.3	-0.02	6.3	.36		30M	0	L393
L396M	21.0	4.2	1.44	8.2	1.55		66.5	21.0	1.37	23.5	1.34		30N	0	L396M
L565	19.9	3.1	1.07	7.4	1.39		61.0	13.5	.88	18.0	1.03		30N	0	L565
L589	12.9	-3.9	-1.33	2.6	.48		32.7	-14.8	-0.97	9.2	.52		30N	0	L589
L595	17.5	.0	.22	3.8	.71		67.6	20.1	1.31	20.8	1.19		30C	0	L595
L670	20.2	3.4	1.10	6.6	1.24		56.3	8.8	.58	17.9	1.03		30N	0	L670
L734	11.8	-5.0	-1.74	2.0	.38		46.5	1.0	.07	19.0	1.09		30C	*	L734
L737	13.1	-3.8	-1.30	3.2	.60		34.1	-13.4	-0.87	15.6	.89		30N	0	L737

GR. MEAN = 16.8 DOUBLE FOLDS GRAND MEAN = 47.5 DOUBLE FOLDS TEST DETERMINATIONS = 15
SD MEANS = 2.9 DOUBLE FOLDS SD OF MEANS = 15.3 DOUBLE FOLDS 39 LABS IN GRAND MEANS
AVERAGE SDR = 5.3 DOUBLE FOLDS AVERAGE SDR = 17.5 DOUBLE FOLDS

L182S	24.6	7.8	2.08	5.0	.94	45.5	-2.0	-0.13	15.5	.89	30S	*	L182S
L190D	20.1	3.2	1.12	5.4	1.02	15.5	-32.0	-2.09	4.9	.28	30S	*	L190D
L326S	15.9	-0.9	-0.31	4.6	.87	26.1	-21.4	-1.40	9.0	.51	30S	*	L326S
L705	15.6	-1.2	-0.41	2.4	.45	56.6	-8.9	-0.58	5.9	.34	30X	*	L705
L706	11.1	-5.8	-1.99	3.1	.58	12.7	-34.8	-2.27	6.5	.37	30X	*	L706

TOTAL NUMBER OF LABORATORIES REPORTING = 47

Best values: B30 17 double folds
B80 49 double folds

The following laboratories were omitted from the grand means because of extreme test results: 176, 285B.

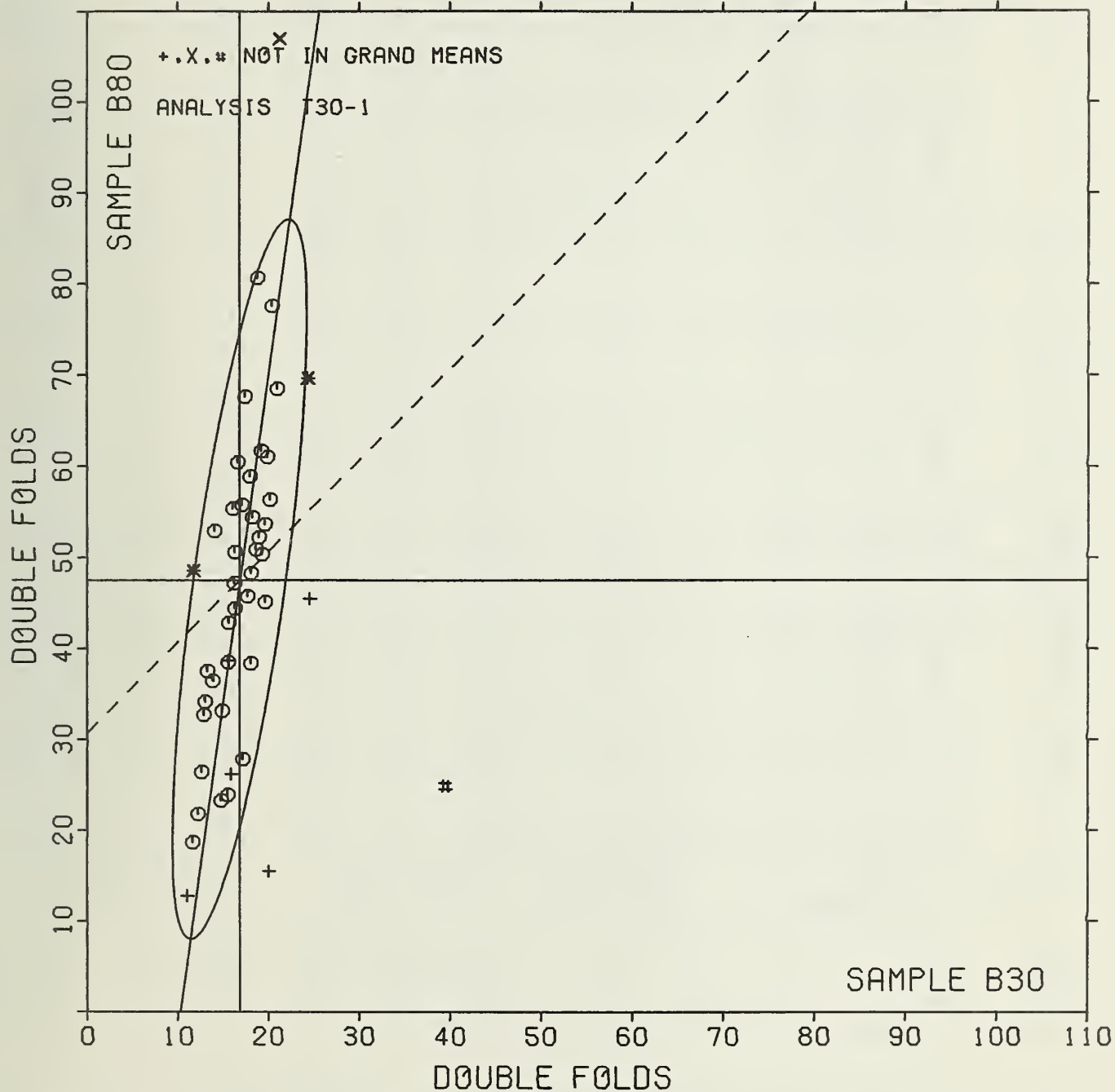
The ISO (International Standards Organization) is proposing that MIT folding endurance be reported as the logarithm (to the base 10) of the double fold instead of the double fold as in the past.

Please see page 44 of this report for a demonstration of this proposal.

LAB CODE	F	MEANS		COORDINATES		AVG		PROPERTY--TEST INSTRUMENT--CONDITIONS
		E30	B80	MAJOR	MINOR	REORDER	VAR	
L706	*	110.1	120.7	-35.2	0.9	0.48	30X	FOLDING ENDURANCE: GIVE INSTRUMENT MAKE AND MODEL
L238B	Ø	110.7	180.7	-29.3	10.1	0.70	30D	FOLDING ENDURANCE, MIT, MODIFIED DRIVE TO REDUCE HEATING
L734	*	110.8	480.5	0.3	50.1	0.74	30C	FOLDING ENDURANCE, MIT, CIRCULATING FAN IN CEILING
L158	Ø	120.3	210.8	-260.1	10.0	0.55	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L339	Ø	120.7	260.4	-210.5	10.2	0.70	30M	FOLDING ENDURANCE, MIT, WITH CENTRIFUGAL FAN
L589	Ø	120.9	320.7	-150.2	10.8	0.50	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L737	Ø	130.1	340.1	-130.8	10.9	0.75	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L105	Ø	130.3	370.5	-100.4	20.1	0.66	30M	FOLDING ENDURANCE, MIT, WITH CENTRIFUGAL FAN
L376	Ø	130.9	360.4	-110.4	10.3	0.51	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L230	Ø	140.1	520.9	40.9	30.4	0.51	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L326N	Ø	140.8	230.3	-240.3	-10.3	0.57	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L390	Ø	140.9	330.1	-140.5	-0.1	0.58	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L278	Ø	150.5	230.9	-230.6	-20.0	0.57	30C	FOLDING ENDURANCE, MIT, CIRCULATING FAN IN CEILING
L285A	Ø	150.0	380.5	-90.1	-0.0	10.27	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L705	*	150.6	380.6	-80.9	-0.0	0.59	30X	FOLDING ENDURANCE: GIVE INSTRUMENT MAKE AND MODEL
L162	Ø	150.7	420.8	-40.8	0.5	0.59	30M	FOLDING ENDURANCE, MIT, WITH CENTRIFUGAL FAN
L326S	*	150.9	260.1	-210.3	-20.1	0.69	30S	FOLDING ENDURANCE, SCHÖPPER, LEIPZIG
L388	Ø	160.1	550.3	70.7	10.8	10.15	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L393	Ø	160.3	470.2	-0.4	0.5	0.54	30M	FOLDING ENDURANCE, MIT, WITH CENTRIFUGAL FAN
L163	Ø	160.3	440.4	-30.1	0.1	0.65	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L238A	Ø	160.3	500.6	30.0	0.9	0.50	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L121	Ø	160.7	600.4	120.8	10.9	10.55	30M	FOLDING ENDURANCE, MIT, WITH CENTRIFUGAL FAN
L262	Ø	170.1	550.7	80.2	0.8	10.20	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L275	Ø	170.2	270.8	-190.5	-30.1	0.55	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L599	Ø	170.5	670.6	200.0	20.1	0.55	30C	FOLDING ENDURANCE, MIT, CIRCULATING FAN IN CEILING
L190C	Ø	170.7	450.7	-100	-10.1	10.06	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L279	Ø	180.0	580.9	110.4	0.4	10.03	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L118	Ø	180.1	380.3	-80.9	-20.5	0.78	30D	FOLDING ENDURANCE, MIT, MODIFIED DRIVE TO REDUCE HEATING
L212	Ø	180.1	480.3	0.9	-10.2	0.57	30M	FOLDING ENDURANCE, MIT, WITH CENTRIFUGAL FAN
L321	Ø	180.3	540.4	70.0	-0.5	10.41	30M	FOLDING ENDURANCE, MIT, WITH CENTRIFUGAL FAN
L159	Ø	180.7	500.9	30.0	-10.4	0.50	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L254	Ø	180.9	800.6	530.1	20.6	10.76	30M	FOLDING ENDURANCE, MIT, WITH CENTRIFUGAL FAN
L243	Ø	190.0	520.2	50.0	-10.5	10.42	30D	FOLDING ENDURANCE, MIT, MODIFIED DRIVE TO REDUCE HEATING
L150	Ø	190.3	610.7	140.4	-0.5	10.06	30M	FOLDING ENDURANCE, MIT, WITH CENTRIFUGAL FAN
L320	Ø	190.3	500.3	30.2	-20.1	10.20	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L124	Ø	190.7	530.6	00.4	-20.0	0.66	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L223F	Ø	190.7	450.1	-20.0	-30.1	0.50	30M	FOLDING ENDURANCE, MIT, WITH CENTRIFUGAL FAN
L565	Ø	190.9	610.0	130.8	-10.2	10.21	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L190D	*	200.1	150.5	-310.3	-70.6	0.65	30S	FOLDING ENDURANCE, SCHÖPPER, LEIPZIG
L670	Ø	200.2	560.3	90.2	-20.1	10.13	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L185	Ø	200.5	770.5	300.2	0.5	10.20	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L396M	Ø	210.0	680.5	210.5	-10.2	10.45	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L122	X	210.3	1070.0	590.5	30.8	20.20	30M	FOLDING ENDURANCE, MIT, WITH CENTRIFUGAL FAN
L182M	*	240.4	690.6	220.9	-40.4	0.76	30M	FOLDING ENDURANCE, MIT, WITH CENTRIFUGAL FAN
L182S	*	240.6	450.5	-0.9	-80.0	0.51	30S	FOLDING ENDURANCE, SCHÖPPER, LEIPZIG
L176	#	340.7	1370.2	910.5	-50.3	30.23	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
L285B	#	380.9	230.9	-200.4	-250.1	10.53	30N	FOLDING ENDURANCE, MIT, NO CENTRIFUGAL FAN
GMEANS:		160.8	470.5			10.00		
95% ELLIPSE:				390.9	50.1	WITH GAMMA = 82 DEGREES		

FOLDING ENDURANCE (MIT)

SAMPLE B30 = 16.8 DOUBLE FOLDS SAMPLE B80 = 47.5 DOUBLE FOLDS



ANALYSIS T30-2 TABLE 1

FOLDING ENDURANCE (MIT)

DATA IS LOG(BASE 10) OF THE DOUBLE FOLD MEASUREMENT

LAB CODE	SAMPLE B30 MEAN	BOOK PAPER 77 GRAMS PER SQUARE METER				SAMPLE B30 MEAN	COATED OFFSET BOOK 75 GRAMS PER SQUARE METER				TEST D ₀ = 15		
		DEV	N ₀ DEV	SDR	R ₀ SDR		DEV	N ₀ DEV	SDR	R ₀ SDR	VAR	F	LAB
L105	1.12	-.08	-1.00	.08	.59	1.54	-.09	-.55	.19	1.13	30M	Ø	L105
L118	1.24	.04	.00	.10	.77	1.57	-.06	-.37	.13	.75	30D	Ø	L118
L121	1.20	-.00	-1.00	.15	1.12	1.74	.11	.64	.21	1.23	30M	Ø	L121
L122	1.31	.11	1.00	.13	1.00	1.95	.33	1.93	.29	1.71	30M	Ø	L122
L124	1.28	.08	1.01	.11	.83	1.72	.09	.52	.11	.66	30N	Ø	L124
L150	1.26	.00	.70	.15	1.14	1.78	.15	.88	.11	.65	30M	Ø	L150
L158	1.08	-.12	-1.01	.10	.73	1.30	-.33	-1.95	.19	1.10	30N	Ø	L158
L159	1.26	.00	.70	.09	.68	1.69	.06	.34	.14	.85	30N	Ø	L159
L162	1.18	-.02	-.27	.11	.82	1.59	-.04	-.26	.20	1.20	30M	Ø	L162
L163	1.20	-.00	-.00	.12	.91	1.62	-.00	-.03	.15	.86	30N	Ø	L163
L176	1.51	.30	3.00	.19	1.39	2.05	.42	2.49	.34	2.03	30N	#	L176
L182M	1.38	.18	2.01	.09	.63	1.84	.21	1.23	.08	.46	30M	Ø	L182M
L185	1.29	.09	1.10	.13	.96	1.87	.24	1.43	.14	.82	30N	Ø	L185
L190C	1.22	.02	.20	.17	1.23	1.64	.01	.08	.13	.80	30N	Ø	L190C
L212	1.24	.04	.54	.12	.86	1.65	.03	.15	.17	.99	30M	Ø	L212
L223F	1.28	.08	1.00	.12	.85	1.63	.00	.02	.15	.86	30M	Ø	L223F
L230	1.13	-.07	-.97	.14	1.07	1.71	.08	.47	.11	.67	30N	Ø	L230
L238A	1.20	-.01	-.07	.13	.93	1.68	.05	.32	.14	.82	30N	Ø	L238A
L238B	1.04	-.17	-2.17	.18	1.33	1.21	-.42	-2.47	.24	1.42	30D	Ø	L238B
L243	1.25	.05	.07	.15	1.09	1.68	.05	.27	.19	1.14	30D	Ø	L243
L254	1.25	.04	.07	.17	1.25	1.85	.22	1.33	.24	1.41	30M	Ø	L254
L262	1.21	.01	.00	.15	1.10	1.72	.09	.54	.15	.89	30N	Ø	L262
L275	1.21	.01	.07	.17	1.26	1.41	-.21	-1.27	.16	.97	30N	Ø	L275
L278	1.16	-.04	-.32	.16	1.17	1.34	-.29	-1.74	.19	1.14	30C	Ø	L278
L279	1.24	.04	.40	.13	.96	1.75	.12	.72	.14	.80	30N	Ø	L279
L285A	1.14	-.06	-.70	.22	1.00	1.53	-.09	-.56	.22	1.28	30N	Ø	L285A
L285B	1.55	.34	4.00	.20	1.50	1.36	-.27	-1.59	.13	.79	30N	#	L285B
L320	1.27	.06	.80	.14	1.02	1.66	.03	.20	.20	1.16	30N	Ø	L320
L321	1.24	.04	.40	.14	1.05	1.68	.05	.31	.23	1.34	30M	Ø	L321
L326N	1.14	-.00	-.81	.16	1.10	1.33	-.30	-1.79	.18	1.09	30N	Ø	L326N
L339	1.08	-.12	-1.54	.13	.97	1.39	-.24	-1.43	.17	1.03	30M	Ø	L339
L376	1.13	-.07	-.90	.11	.84	1.50	-.13	-.78	.25	1.46	30N	Ø	L376
L388	1.18	-.02	-.20	.16	1.21	1.71	.09	.51	.16	.96	30N	Ø	L388
L390	1.15	-.05	-.07	.15	1.68	1.46	-.16	-.97	.24	1.40	30N	Ø	L390
L393	1.19	-.01	-.14	.14	1.01	1.67	.04	.24	.06	.34	30M	Ø	L393
L396M	1.29	.09	1.10	.10	1.20	1.80	.17	1.03	.19	1.11	30N	Ø	L396M
L565	1.27	.07	.00	.17	1.24	1.77	.14	.82	.13	.78	30N	Ø	L565
L589	1.10	-.10	-1.20	.08	.62	1.50	-.13	-.78	.13	.76	30N	Ø	L589
L599	1.23	.03	.40	.09	.67	1.81	.18	1.07	.14	.83	30C	Ø	L599
L670	1.28	.08	1.01	.16	1.18	1.73	.10	.59	.15	.87	30N	Ø	L670
L734	1.07	-.14	-1.70	.08	.60	1.66	.03	.16	.17	.99	30C	#	L734
L737	1.10	-.10	-1.20	.11	.79	1.49	-.14	-.83	.21	1.26	30N	Ø	L737
GR ₀ MEAN = 1.20 LOG(10) FOLD													
SD MEANS = .08 LOG(10) FOLD													
AVERAGE SDR = .13 LOG(10) FOLD													
GRAND MEAN = 1.63 LOG(10) FOLD													
SD OF MEANS = .17 LOG(10) FOLD													
AVERAGE SDR = .17 LOG(10) FOLD													
TEST DETERMINATIONS = 15													
40 LABS IN GRAND MEANS													
L182S	1.38	.18	2.04	.09	.67	1.64	.01	.04	.14	.85	30S	*	L182S
L190D	1.29	.06	1.00	.13	.97	1.17	-.46	-2.73	.14	.85	30S	*	L190D
L326S	1.19	-.02	-.22	.13	.94	1.40	-.23	-1.37	.13	.77	30S	*	L326S
L705	1.19	-.01	-.17	.07	.50	1.55	-.05	-.28	.07	.40	30X	*	L705
L706	1.03	-.17	-2.20	.12	.67	1.06	-.57	-3.38	.21	1.24	30X	*	L706
TOTAL NUMBER OF LABORATORIES REPORTING = 47													

The ISO (International Standards Organization) is proposing that MIT folding endurance be reported as the logarithm (to the base 10) of the double fold instead of the double fold as in the past.

Analysis T30-1 in this report is the same as in the past with no changes. The analysis, T30-2, shows the data as the ISO proposes. This analysis uses the raw data reported for T30-1. The raw data are converted to the logarithm (base 10) as shown in the example to the right, and then the mean or the converted data is calculated and reported as ISO folding endurance.

Raw data
(Folding number
in double folds)

log (base 10)
of raw data

207
106
101
502
200
157
159
250

210

2.32
2.02
2.01
2.52
2.41
2.14
2.30
2.36

2.31

mean of raw data

mean of logs
"Folding endurance"

ANALYSIS T30-2 TABLE 2
FOLDING ENDURANCE (MIT)
DATA IS LOG(BASE 10) OF THE DOUBLE FOLD MEASUREMENT

LAB CODE	F	MEANS		COORDINATES		AVG		PROPERTY---	TEST	INSTRUMENT---	CONDITIONS
		E30	B80	MAJOR	MINOR	MAJOR	VAR				
L706	*	1.03	1.06	-0.00	-0.04	1.005	30X	FOLDING	ENDURANCE:	GIVE	INSTRUMENT MAKE AND MODEL
L238B	Ø	1.04	1.01	-0.40	0.01	1.037	30D	FOLDING	ENDURANCE,	MIT,	MODIFIED DRIVE TO REDUCE HEATING
L734	*	1.07	1.66	-0.02	0.14	0.60	30C	FOLDING	ENDURANCE,	MIT,	CIRCULATING FAN IN CEILING
L158	Ø	1.08	1.30	-0.35	0.00	0.92	30N	FOLDING	ENDURANCE,	MIT,	NO CENTRIFUGAL FAN
L339	Ø	1.08	1.39	-0.27	0.03	1.000	30M	FOLDING	ENDURANCE,	MIT,	WITH CENTRIFUGAL FAN
L737	Ø	1.10	1.49	-0.17	0.04	1.002	30N	FOLDING	ENDURANCE,	MIT,	NO CENTRIFUGAL FAN
L589	Ø	1.10	1.50	-0.10	0.05	0.69	30N	FOLDING	ENDURANCE,	MIT,	NO CENTRIFUGAL FAN
L105	Ø	1.12	1.54	-0.12	0.05	0.66	30M	FOLDING	ENDURANCE,	MIT,	WITH CENTRIFUGAL FAN
L230	Ø	1.13	1.71	0.05	0.10	0.67	30N	FOLDING	ENDURANCE,	MIT,	NO CENTRIFUGAL FAN
L376	Ø	1.13	1.50	-0.15	0.02	1.115	30N	FOLDING	ENDURANCE,	MIT,	NO CENTRIFUGAL FAN
L326N	Ø	1.14	1.33	-0.31	-0.05	1.113	30N	FOLDING	ENDURANCE,	MIT,	NO CENTRIFUGAL FAN
L285A	Ø	1.14	1.53	-0.11	0.02	1.047	30N	FOLDING	ENDURANCE,	MIT,	NO CENTRIFUGAL FAN
L390	Ø	1.15	1.46	-0.17	-0.01	1.024	30N	FOLDING	ENDURANCE,	MIT,	NO CENTRIFUGAL FAN
L278	Ø	1.16	1.34	-0.29	-0.07	1.015	30C	FOLDING	ENDURANCE,	MIT,	CIRCULATING FAN IN CEILING
L388	Ø	1.18	1.71	0.07	0.05	1.009	30N	FOLDING	ENDURANCE,	MIT,	NO CENTRIFUGAL FAN
L162	Ø	1.18	1.59	-0.05	0.00	1.001	30M	FOLDING	ENDURANCE,	MIT,	WITH CENTRIFUGAL FAN
L326S	*	1.19	1.40	-0.22	-0.07	0.66	30S	FOLDING	ENDURANCE,	SCHÖPPER,	LEIPZIG
L705	*	1.19	1.58	-0.05	-0.00	0.43	30A	FOLDING	ENDURANCE:	GIVE	INSTRUMENT MAKE AND MODEL
L393	Ø	1.19	1.67	0.03	0.02	0.68	30M	FOLDING	ENDURANCE,	MIT,	WITH CENTRIFUGAL FAN
L238A	Ø	1.20	1.68	0.05	0.02	0.67	30N	FOLDING	ENDURANCE,	MIT,	NO CENTRIFUGAL FAN
L121	Ø	1.20	1.74	0.10	0.04	1.116	30M	FOLDING	ENDURANCE,	MIT,	WITH CENTRIFUGAL FAN
L163	Ø	1.20	1.62	-0.01	0.00	0.69	30N	FOLDING	ENDURANCE,	MIT,	NO CENTRIFUGAL FAN
L275	Ø	1.21	1.41	-0.20	-0.08	1.112	30N	FOLDING	ENDURANCE,	MIT,	NO CENTRIFUGAL FAN
L262	Ø	1.21	1.72	0.09	0.03	1.000	30N	FOLDING	ENDURANCE,	MIT,	NO CENTRIFUGAL FAN
L190C	Ø	1.22	1.64	0.02	-0.01	1.002	30N	FOLDING	ENDURANCE,	MIT,	NO CENTRIFUGAL FAN
L599	Ø	1.23	1.81	0.18	0.03	0.75	30C	FOLDING	ENDURANCE,	MIT,	CIRCULATING FAN IN CEILING
L279	Ø	1.24	1.75	0.13	0.01	0.68	30N	FOLDING	ENDURANCE,	MIT,	NO CENTRIFUGAL FAN
L321	Ø	1.24	1.68	0.06	-0.02	1.019	30M	FOLDING	ENDURANCE,	MIT,	WITH CENTRIFUGAL FAN
L212	Ø	1.24	1.65	0.04	-0.03	0.92	30M	FOLDING	ENDURANCE,	MIT,	WITH CENTRIFUGAL FAN
L118	Ø	1.24	1.57	-0.04	-0.06	0.76	30J	FOLDING	ENDURANCE,	MIT,	MODIFIED DRIVE TO REDUCE HEATING
L254	Ø	1.25	1.85	0.22	0.04	1.033	30M	FOLDING	ENDURANCE,	MIT,	WITH CENTRIFUGAL FAN
L243	Ø	1.25	1.68	0.06	-0.03	1.012	30D	FOLDING	ENDURANCE,	MIT,	MODIFIED DRIVE TO REDUCE HEATING
L150	Ø	1.26	1.78	0.16	-0.00	0.69	30M	FOLDING	ENDURANCE,	MIT,	WITH CENTRIFUGAL FAN
L159	Ø	1.26	1.69	0.07	-0.04	0.77	30N	FOLDING	ENDURANCE,	MIT,	NO CENTRIFUGAL FAN
L320	Ø	1.27	1.66	0.05	-0.05	1.009	30N	FOLDING	ENDURANCE,	MIT,	NO CENTRIFUGAL FAN
L565	Ø	1.27	1.77	0.15	-0.01	1.001	30N	FOLDING	ENDURANCE,	MIT,	NO CENTRIFUGAL FAN
L223F	Ø	1.28	1.63	0.03	-0.07	0.66	30M	FOLDING	ENDURANCE,	MIT,	WITH CENTRIFUGAL FAN
L124	Ø	1.28	1.72	0.11	-0.04	0.74	30N	FOLDING	ENDURANCE,	MIT,	NO CENTRIFUGAL FAN
L670	Ø	1.28	1.73	0.12	-0.04	1.002	30N	FOLDING	ENDURANCE,	MIT,	NO CENTRIFUGAL FAN
L190D	*	1.29	1.17	-0.40	-0.24	0.91	30S	FOLDING	ENDURANCE,	SCHÖPPER,	LEIPZIG
L396M	Ø	1.29	1.80	0.20	-0.02	1.116	30N	FOLDING	ENDURANCE,	MIT,	NO CENTRIFUGAL FAN
L185	Ø	1.29	1.87	0.26	0.00	0.69	30N	FOLDING	ENDURANCE,	MIT,	NO CENTRIFUGAL FAN
L122	Ø	1.31	1.95	0.34	0.01	1.035	30M	FOLDING	ENDURANCE,	MIT,	WITH CENTRIFUGAL FAN
L182M	Ø	1.38	1.84	0.20	-0.09	0.54	30M	FOLDING	ENDURANCE,	MIT,	WITH CENTRIFUGAL FAN
L182S	*	1.38	1.64	0.07	-0.17	0.70	30S	FOLDING	ENDURANCE,	SCHÖPPER,	LEIPZIG
L176	#	1.51	2.05	0.50	-0.14	1.071	30N	FOLDING	ENDURANCE,	MIT,	NO CENTRIFUGAL FAN
L285B	#	1.55	1.36	-0.13	-0.42	1.015	30N	FOLDING	ENDURANCE,	MIT,	NO CENTRIFUGAL FAN
GMEANS:		1.20	1.63			1.000					
55% ELLIPSE:				0.40	0.12	WITH GAMMA = 69 DEGREES					

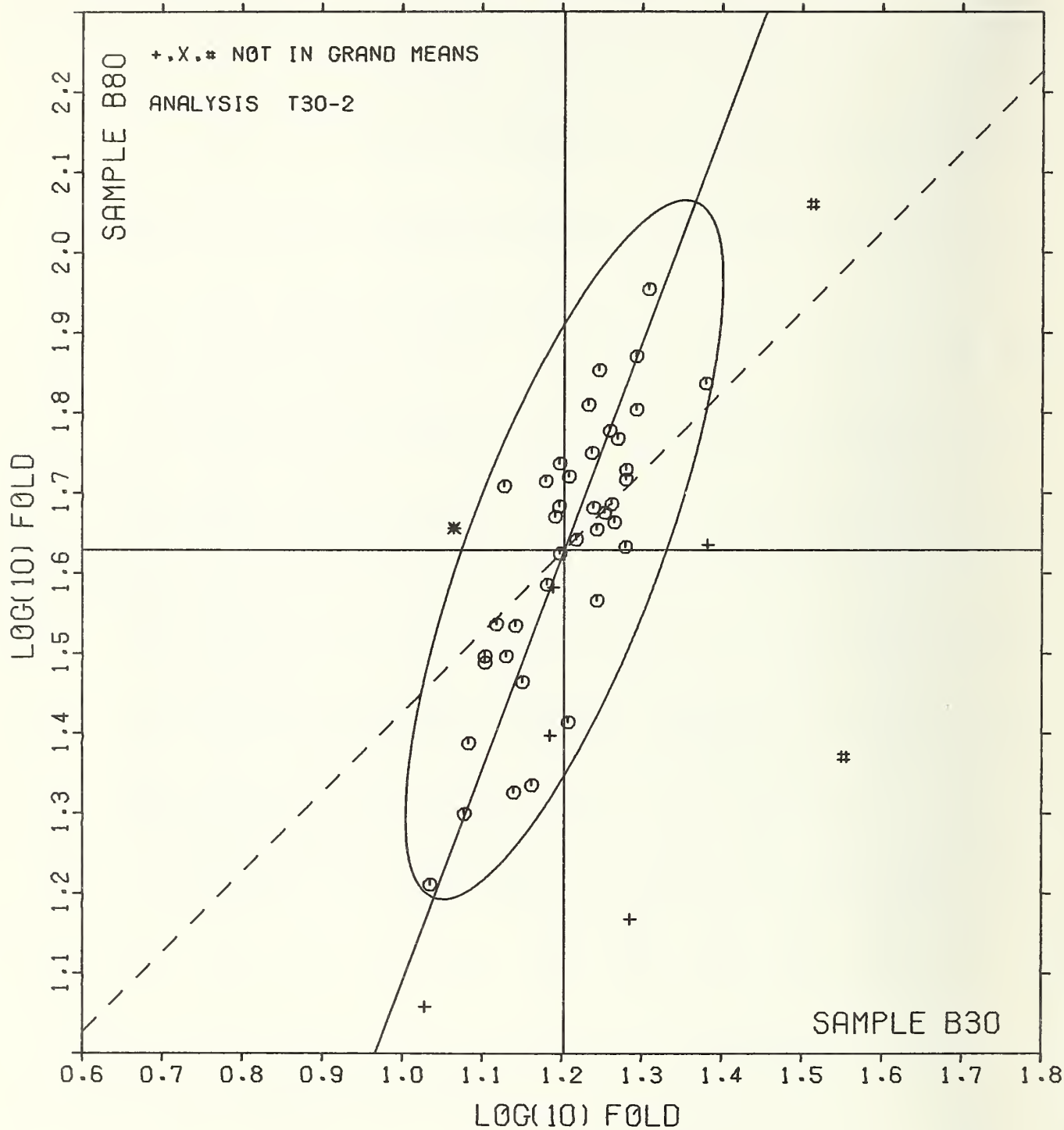
FOLDING ENDURANCE (MIT)

SAMPLE B30 = 1.20

LOG(10) FOLD

SAMPLE B80 = 1.63

LOG(10) FOLD



ANALYSIS T35-1 TABLE 1

GURLEY STIFFNESS

RESULTS EXPRESSED IN STANDARD GURLEY UNITS: MILLIGRAMS FOR A 1X3 INCH SPECIMEN (ACTUAL LENGTH 3.5 INCHES)

LAB CODE	SAMPLE K04 MEAN	PRESSING 103 GRAMS PER SQUARE METER				SAMPLE A58 MEAN	WAVE ENVELOPE 94 GRAMS PER SQUARE METER				TEST D ₀ = 10		
		DEV	No. DEV	SDR	R ₀ SDR		DEV	No. DEV	SDR	R ₀ SDR	VAR	F	LAB
L118	222.	-22.	-1.03	9.	.68	258.	-23.	-1.31	10.	.61	35G	Ø	L118
L121	226.	-19.	-1.03	10.	.72	243.	-39.	-2.17	12.	.69	35G	Ø	L121
L122	235.	-9.	-.07	15.	1.12	284.	2.	.11	21.	1.26	35G	Ø	L122
L132	202.	17.	1.43	15.	1.11	280.	-2.	-.10	19.	1.13	35G	Ø	L132
L139	242.	-3.	-.20	9.	.65	262.	-20.	-1.13	6.	.34	35G	Ø	L139
L148	239.	-5.	-.39	11.	.81	262.	-0.	-.01	14.	.82	35G	Ø	L148
L159	273.	28.	2.04	14.	1.03	309.	27.	1.53	22.	1.29	35G	Ø	L159
L162	241.	-4.	-.28	6.	.40	259.	-22.	-1.24	7.	.40	35G	Ø	L162
L163	235.	-9.	-.67	17.	1.20	289.	8.	.43	34.	2.02	35G	Ø	L163
L172	219.	-25.	-1.64	18.	1.37	272.	-10.	-.55	19.	1.13	35G	Ø	L172
L183	265.	21.	1.40	10.	.77	320.	38.	2.13	15.	.88	35G	Ø	L183
L190C	260.	16.	1.14	10.	.75	287.	5.	.27	7.	.45	35G	Ø	L190C
L195	257.	12.	.87	10.	.75	287.	6.	.31	13.	.77	35G	Ø	L195
L212	204.	20.	1.40	28.	2.13	302.	20.	1.14	39.	2.34	35G	Ø	L212
L223	246.	1.	.10	10.	.76	282.	1.	.03	13.	.77	35G	Ø	L223
L224	244.	-1.	-.17	14.	1.07	293.	11.	.63	12.	.72	35G	Ø	L224
L232	249.	4.	.31	40.	3.03	281.	-1.	-.07	13.	.79	35G	Ø	L232
L241	161.	-83.	-5.03	7.	.49	196.	-86.	-4.81	18.	1.06	35G	#	L241
L254	230.	-14.	-1.03	6.	.46	274.	-7.	-.41	17.	1.01	35G	Ø	L254
L260	255.	10.	.74	7.	.55	279.	-2.	-.13	5.	.26	35G	Ø	L260
L268	241.	-3.	-.24	14.	1.02	281.	-0.	-.02	16.	.96	35G	Ø	L268
L285	171.	-74.	-5.26	2.	.57	200.	-81.	-4.55	14.	.84	35G	#	L285
L291	264.	19.	1.37	8.	.58	308.	26.	1.45	20.	1.17	35G	Ø	L291
L308	239.	-6.	-.41	9.	.64	277.	-5.	-.27	12.	.72	35G	Ø	L308
L321	283.	38.	2.70	13.	.99	351.	69.	3.85	15.	.88	35G	#	L321
L348	189.	-56.	-4.04	5.	.36	215.	-67.	-3.72	14.	.85	35G	#	L348
L356	230.	-14.	-1.04	9.	.69	260.	-21.	-1.19	15.	.89	35G	Ø	L356
L376	246.	2.	.14	14.	1.07	301.	20.	1.10	34.	2.02	35G	Ø	L376
L382	252.	8.	.57	13.	1.00	263.	1.	.05	16.	.93	35G	Ø	L382
L390	238.	-6.	-.40	9.	.69	292.	11.	.59	7.	.39	35G	Ø	L390
L562	244.	-1.	-.04	19.	1.42	250.	-32.	-1.78	11.	.63	35G	Ø	L562
L571	257.	12.	.83	24.	1.80	345.	63.	3.53	15.	.90	35G	#	L571
L600	247.	2.	.17	11.	.85	298.	17.	.93	12.	.73	35G	Ø	L600
L650	200.	15.	1.03	10.	.77	242.	-40.	-2.22	24.	1.44	35G	#	L650
L729	3520.	3276.	23.047	215.	16.09	4249.	3568.	221.62	221.	13.22	35G	#	L729
L732	226.	-19.	-1.03	20.	1.53	276.	-6.	-.34	48.	2.85	35G	Ø	L732
GR. MEAN = 245. GURLEY UNITS GRAND MEAN = 282. GURLEY UNITS TEST DETERMINATIONS = 10													
SD MEANS = 14. GURLEY UNITS SD OF MEANS = 18. GURLEY UNITS 29 LABS IN GRAND MEANS													
AVERAGE SDR = 13. GURLEY UNITS AVERAGE SDR = 17. GURLEY UNITS													
L213	241.	-4.	-.28	9.	.66	271.	-11.	-.60	14.	.82	35H	Ø	L213
TOTAL NUMBER OF LABORATORIES REPORTING = 37													
Best values: K04 240 ± 24 Gurley units													
A58 280 ± 29 Gurley units													

The following laboratories were omitted from the grand means because of extreme test results: 285, 321, 348, 571, 650.

Data from the following laboratories appear to be off by a multiplicative factor: 241, 729

ANALYSIS T35-1 TABLE 2

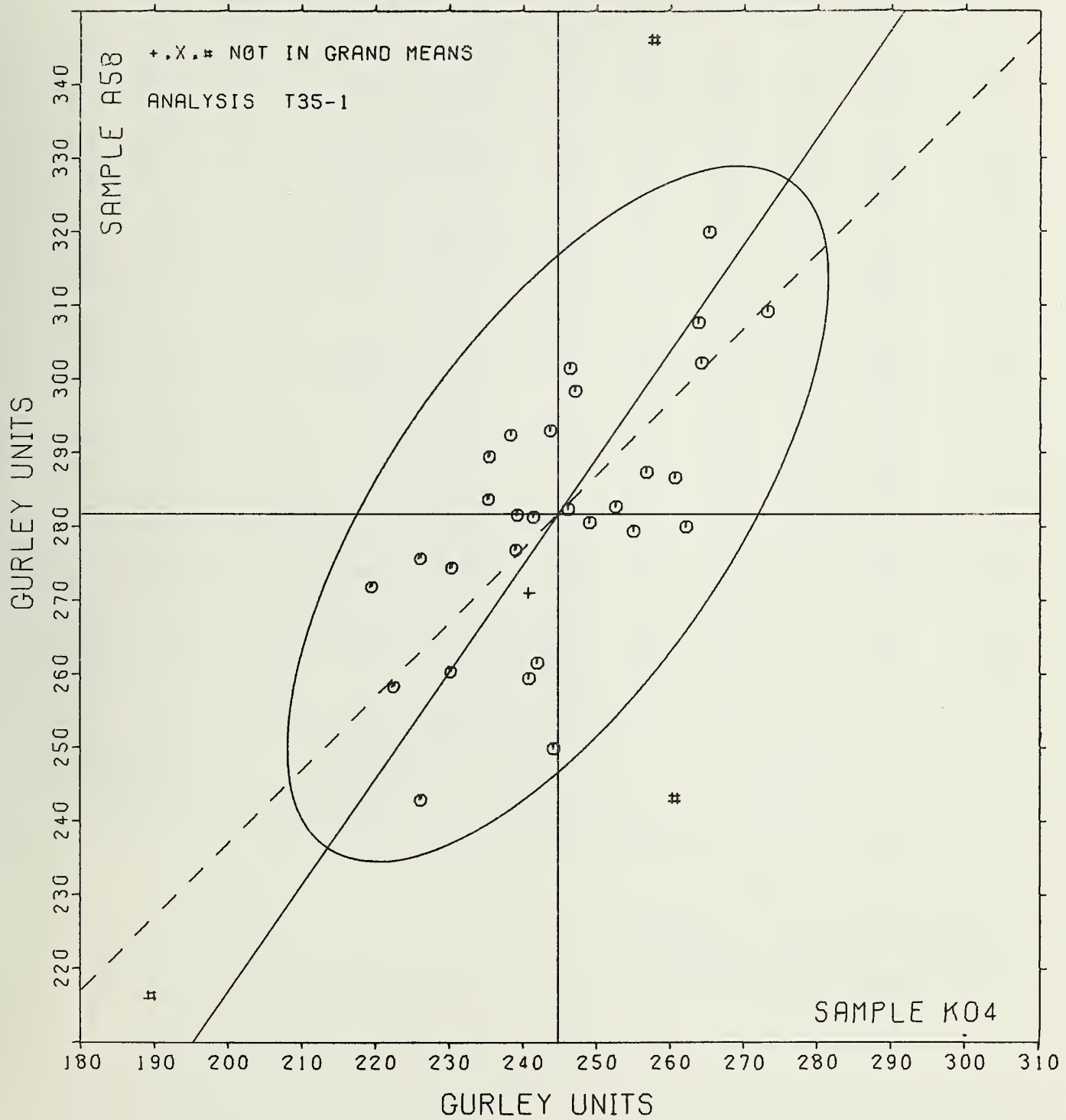
GURLEY STIFFNESS

RESULTS EXPRESSED IN STANDARD GURLEY UNITS: MILLIGRAMS FOR A 1X3 INCH SPECIMEN (ACTUAL LENGTH 3.5 INCHES)

LAB CODE	F	MEANS		COORDINATES		AVG NO. SUR	VAR	PROPERTY---TEST INSTRUMENT---CONDITIONS		
		K04	A58	MAJOR	MINOR					
L241	#	161.	196.	-110.	20.	077	350	STIFFNESS, GURLEY (UNITS: MG/1X3	-ACTUALLY 3.5-	TEST PIECE)
L285	#	171.	200.	-109.	14.	071	350	STIFFNESS, GURLEY (UNITS: MG/1X3	-ACTUALLY 3.5-	TEST PIECE)
L348	#	189.	215.	-80.	8.	061	350	STIFFNESS, GURLEY (UNITS: MG/1X3	-ACTUALLY 3.5-	TEST PIECE)
L172	0	219.	272.	-22.	15.	1025	350	STIFFNESS, GURLEY (UNITS: MG/1X3	-ACTUALLY 3.5-	TEST PIECE)
L118	0	222.	258.	-52.	5.	065	350	STIFFNESS, GURLEY (UNITS: MG/1X3	-ACTUALLY 3.5-	TEST PIECE)
L732	0	226.	276.	-10.	12.	2019	350	STIFFNESS, GURLEY (UNITS: MG/1X3	-ACTUALLY 3.5-	TEST PIECE)
L121	0	226.	243.	-42.	-7.	071	350	STIFFNESS, GURLEY (UNITS: MG/1X3	-ACTUALLY 3.5-	TEST PIECE)
L356	0	230.	260.	-20.	-0.	079	350	STIFFNESS, GURLEY (UNITS: MG/1X3	-ACTUALLY 3.5-	TEST PIECE)
L254	0	230.	274.	-14.	8.	074	350	STIFFNESS, GURLEY (UNITS: MG/1X3	-ACTUALLY 3.5-	TEST PIECE)
L122	0	235.	284.	-4.	9.	1019	350	STIFFNESS, GURLEY (UNITS: MG/1X3	-ACTUALLY 3.5-	TEST PIECE)
L163	0	235.	289.	1.	12.	1005	350	STIFFNESS, GURLEY (UNITS: MG/1X3	-ACTUALLY 3.5-	TEST PIECE)
L390	0	238.	292.	5.	11.	054	350	STIFFNESS, GURLEY (UNITS: MG/1X3	-ACTUALLY 3.5-	TEST PIECE)
L308	0	239.	277.	-7.	2.	009	350	STIFFNESS, GURLEY (UNITS: MG/1X3	-ACTUALLY 3.5-	TEST PIECE)
L148	0	239.	282.	-3.	4.	001	350	STIFFNESS, GURLEY (UNITS: MG/1X3	-ACTUALLY 3.5-	TEST PIECE)
L213	*	241.	271.	-11.	-3.	074	350	STIFFNESS, GURLEY (UNITS: MG/1X3	TEST PIECE), 20 C, 65% RH	
L162	0	241.	259.	-21.	-9.	043	350	STIFFNESS, GURLEY (UNITS: MG/1X3	-ACTUALLY 3.5-	TEST PIECE)
L268	0	241.	281.	-2.	2.	059	350	STIFFNESS, GURLEY (UNITS: MG/1X3	-ACTUALLY 3.5-	TEST PIECE)
L139	0	242.	262.	-18.	-9.	050	350	STIFFNESS, GURLEY (UNITS: MG/1X3	-ACTUALLY 3.5-	TEST PIECE)
L224	0	244.	293.	9.	7.	009	350	STIFFNESS, GURLEY (UNITS: MG/1X3	-ACTUALLY 3.5-	TEST PIECE)
L562	0	244.	250.	-20.	-18.	1063	350	STIFFNESS, GURLEY (UNITS: MG/1X3	-ACTUALLY 3.5-	TEST PIECE)
L223	0	246.	282.	1.	-1.	076	350	STIFFNESS, GURLEY (UNITS: MG/1X3	-ACTUALLY 3.5-	TEST PIECE)
L376	0	246.	301.	17.	10.	1055	350	STIFFNESS, GURLEY (UNITS: MG/1X3	-ACTUALLY 3.5-	TEST PIECE)
L600	0	247.	298.	15.	7.	079	350	STIFFNESS, GURLEY (UNITS: MG/1X3	-ACTUALLY 3.5-	TEST PIECE)
L232	0	249.	281.	1.	-4.	1051	350	STIFFNESS, GURLEY (UNITS: MG/1X3	-ACTUALLY 3.5-	TEST PIECE)
L382	0	252.	283.	5.	-6.	057	350	STIFFNESS, GURLEY (UNITS: MG/1X3	-ACTUALLY 3.5-	TEST PIECE)
L260	0	255.	279.	4.	-10.	042	350	STIFFNESS, GURLEY (UNITS: MG/1X3	-ACTUALLY 3.5-	TEST PIECE)
L195	0	257.	287.	12.	-7.	076	350	STIFFNESS, GURLEY (UNITS: MG/1X3	-ACTUALLY 3.5-	TEST PIECE)
L571	#	257.	345.	59.	20.	1055	350	STIFFNESS, GURLEY (UNITS: MG/1X3	-ACTUALLY 3.5-	TEST PIECE)
L650	#	260.	242.	-24.	-35.	1010	350	STIFFNESS, GURLEY (UNITS: MG/1X3	-ACTUALLY 3.5-	TEST PIECE)
L190C	0	260.	287.	15.	-10.	066	350	STIFFNESS, GURLEY (UNITS: MG/1X3	-ACTUALLY 3.5-	TEST PIECE)
L132	0	262.	280.	8.	-15.	1012	350	STIFFNESS, GURLEY (UNITS: MG/1X3	-ACTUALLY 3.5-	TEST PIECE)
L291	0	264.	308.	32.	-1.	000	350	STIFFNESS, GURLEY (UNITS: MG/1X3	-ACTUALLY 3.5-	TEST PIECE)
L212	0	264.	302.	20.	-4.	2024	350	STIFFNESS, GURLEY (UNITS: MG/1X3	-ACTUALLY 3.5-	TEST PIECE)
L183	0	265.	320.	43.	5.	002	350	STIFFNESS, GURLEY (UNITS: MG/1X3	-ACTUALLY 3.5-	TEST PIECE)
L159	0	273.	309.	39.	-8.	1010	350	STIFFNESS, GURLEY (UNITS: MG/1X3	-ACTUALLY 3.5-	TEST PIECE)
L321	#	283.	351.	79.	7.	053	350	STIFFNESS, GURLEY (UNITS: MG/1X3	-ACTUALLY 3.5-	TEST PIECE)
L729	#	3520.	4249.	5120.	-442.	10006	350	STIFFNESS, GURLEY (UNITS: MG/1X3	-ACTUALLY 3.5-	TEST PIECE)
GMEANS:		245.	282.			1000				
		55% ELLIPSE:		55.	23.			WITH GAMMA = 55 DEGREES		

STIFFNESS, GURLEY

SAMPLE K04 = 245. GURLEY UNITS SAMPLE A58 = 282. GURLEY UNITS



ANALYSIS T30-1 TABLE 1

TABER STIFFNESS

TAPPI OFFICIAL TEST METHOD T489 GS-76, RESULTS EXPRESSED IN GRAM CENTIMETERS

LAB CODE	SAMPLE 202 INDEX PAPER 225 GRAMS PER SQUARE METER					SAMPLE 217 INDEX PAPER 256 GRAMS PER SQUARE METER					TEST D ₀ = 10		
	MEAN	DEV	N ₀ DEV	SDR	R ₀ SDR	MEAN	DEV	N ₀ DEV	SDR	R ₀ SDR	VAR	F	LAB
L107A	64.5	2.4	0.77	3.0	1.32	70.5	2.7	0.82	2.8	1.22	36T	0	L107A
L122	62.1	0.0	0.00	2.4	1.06	67.1	-0.7	-0.22	2.3	1.03	36D	0	L122
L123	64.9	2.8	0.90	2.4	1.05	67.5	-0.3	-0.09	2.2	0.96	36T	0	L123
L126	60.3	-1.8	-0.57	2.1	0.93	66.4	-1.4	-0.43	1.7	0.73	36T	0	L126
L150	60.6	-1.0	-0.40	2.2	0.94	67.6	-0.2	-0.06	2.1	0.91	36T	0	L150
L158	62.6	0.0	0.00	0.9	0.37	71.5	3.7	1.11	2.9	1.30	36T	0	L158
L163	64.1	2.0	0.64	1.9	0.84	69.5	1.7	0.52	2.9	1.29	36T	0	L163
L182	61.6	-0.5	-0.15	2.1	0.90	68.8	1.0	0.29	2.0	0.90	36T	0	L182
L207	64.3	2.3	0.72	3.9	1.68	71.1	3.3	0.99	3.2	1.41	36T	0	L207
L212	61.9	-0.2	-0.05	2.4	1.02	66.0	-1.8	-0.53	2.4	1.05	36T	0	L212
L228	60.9	-1.2	-0.38	3.1	1.35	71.8	4.0	1.20	2.7	1.21	36T	*	L228
L230	62.2	0.1	0.04	2.7	1.17	68.5	0.7	0.21	3.2	1.43	36T	0	L230
L242	63.1	1.0	0.32	2.5	1.10	73.1	5.3	1.59	4.0	1.76	36T	0	L242
L243	61.2	-0.8	-0.27	2.9	1.27	64.8	-3.0	-0.91	1.4	0.62	36T	0	L243
L262	62.8	0.8	0.24	1.2	0.50	67.2	-0.6	-0.18	1.5	0.67	36T	0	L262
L268	63.4	1.3	0.42	1.9	0.80	68.5	0.7	0.22	1.9	0.83	36T	0	L268
L281	64.6	2.0	0.62	2.8	1.22	71.3	3.5	1.07	2.0	0.89	36T	0	L281
L290	57.5	-4.3	-1.43	1.9	0.81	65.8	-2.0	-0.61	1.0	0.46	36T	0	L290
L315	61.1	-1.0	-0.32	3.0	1.30	63.8	-4.0	-1.21	3.4	1.52	36T	0	L315
L318	56.7	-5.4	-1.72	2.0	0.87	61.6	-6.2	-1.87	2.3	1.03	36T	0	L318
L321	58.0	-4.1	-1.34	2.7	1.15	64.4	-3.4	-1.04	2.5	1.12	36T	0	L321
L324	61.1	-1.0	-0.32	3.1	1.33	68.6	-1.2	-0.37	1.3	0.59	36T	0	L324
L339	61.3	-0.7	-0.24	2.7	1.19	67.0	-0.8	-0.23	1.7	0.76	36T	0	L339
L348	68.7	6.0	2.12	3.0	1.54	74.0	6.2	1.86	2.7	1.20	36T	0	L348
L388	88.5	26.4	8.43	3.4	1.46	97.5	29.7	8.94	2.9	1.28	36T	#	L388
L442	60.6	-1.5	-0.47	2.6	1.14	64.3	-3.5	-1.05	1.1	0.50	36T	0	L442
L570	67.9	5.8	1.80	2.8	1.40	71.8	4.0	1.20	3.0	1.32	36T	0	L570
L580	62.3	0.2	0.07	1.3	0.54	66.3	-1.5	-0.45	1.5	0.66	36T	0	L580
L604	66.2	4.2	1.33	2.1	0.92	70.5	2.7	0.81	2.6	1.26	36T	0	L604
L616	60.5	3.5	1.11	4.0	1.75	30.7	-37.1	-11.18	0.7	0.30	36T	#	L616
L651	64.2	2.1	0.68	1.5	0.67	72.1	4.3	1.29	1.7	0.74	36T	0	L651
L692	58.5	-3.0	-1.10	1.0	0.69	63.9	-3.9	-1.18	2.5	1.10	36T	0	L692
L703	61.1	-1.0	-0.32	2.7	1.19	66.5	-1.3	-0.41	1.8	0.82	36T	0	L703
L729	63.5	1.4	0.43	1.7	0.76	67.7	-0.1	-0.02	4.0	1.77	36T	0	L729
L731	60.4	-1.7	-0.54	1.8	0.80	65.9	-1.9	-0.56	1.4	0.60	36T	0	L731
L737	52.7	-5.4	-1.84	1.4	0.62	59.3	-8.5	-2.56	1.1	0.49	36T	*	L737
L739	63.8	3.7	1.19	1.8	0.76	70.4	2.6	0.78	1.3	0.56	36T	0	L739

GR₀ MEAN = 62.1 TABER UNITS

SD MEANS = 3.1 TABER UNITS

GRAND MEAN = 67.6 TABER UNITS

SD OF MEANS = 3.3 TABER UNITS

TEST DETERMINATIONS = 10

35 LABS IN GRAND MEANS

AVERAGE SDR =

2.3 TABER UNITS

AVERAGE SDR =

2.3 TABER UNITS

L250 60.0 -2.1 -0.67 3.1 1.35 64.0 -3.8 -1.15 2.2 0.96 36U * L250
TOTAL NUMBER OF LABORATORIES REPORTING = 38

Best values: Z02 62 ± 5 Taber units

Z17 68 ± 5 Taber units

The following laboratories were omitted from the grand means because of extreme test results: 616.

Data from the following laboratories appear to be off by a multiplicative factor: 388

ANALYSIS T36-1 TABLE 2

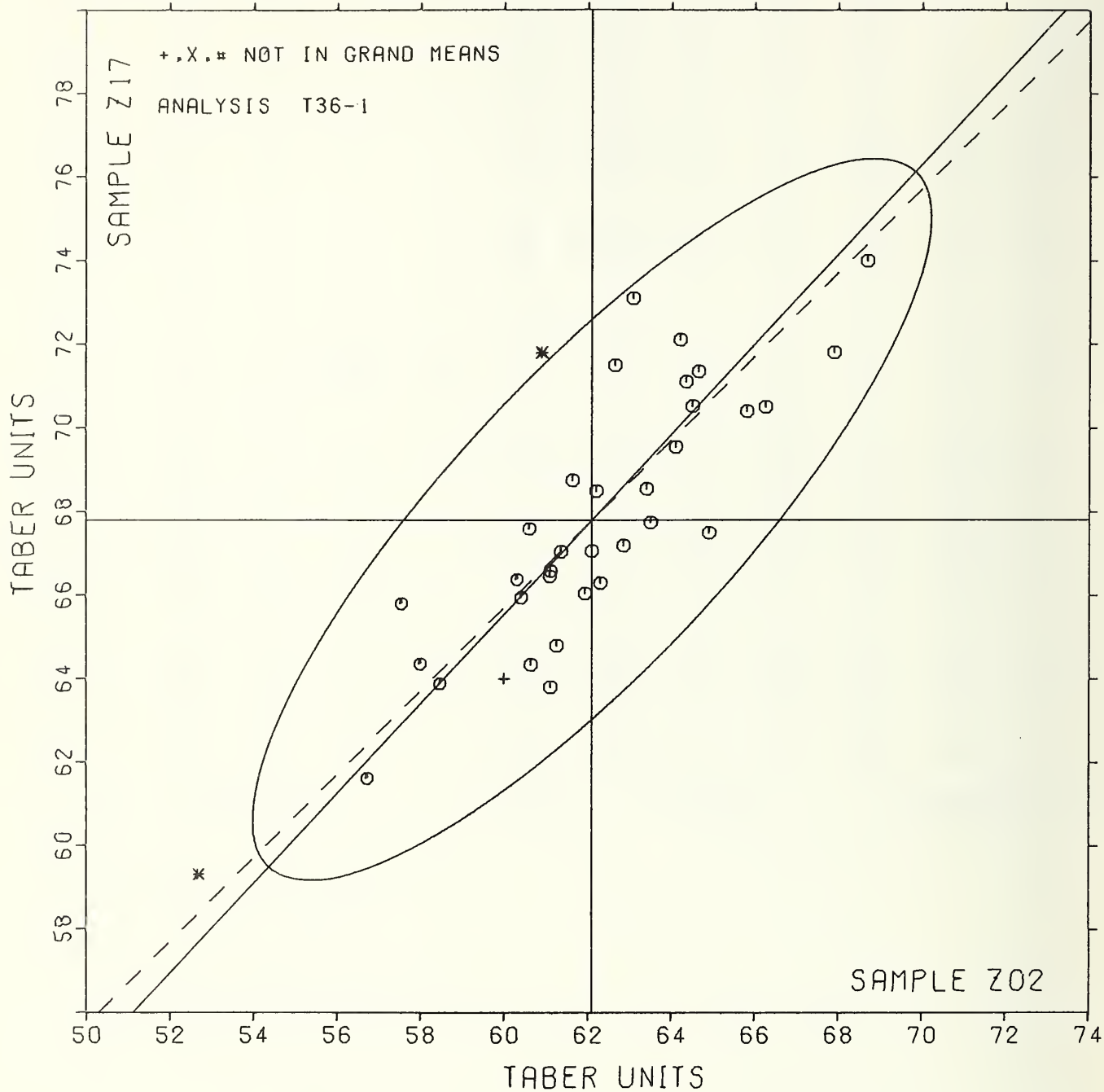
TABER STIFFNESS

TAPPI OFFICIAL TEST METHOD T409 OS-76, RESULTS EXPRESSED IN GRAM CENTIMETERS

LAB CODE	F	MEANS		COORDINATES		AVG		PROPERTY---TEST INSTRUMENT---CONDITIONS
		202	Z17	MAJOR	MINOR	SE	VAR	
L737	*	52.7	59.3	-12.0	1.1	.055	36T	STIFFNESS, TABER
L318	Ø	56.7	61.6	-8.2	-.3	.055	36T	STIFFNESS, TABER
L290	Ø	57.5	65.8	-4.0	2.0	.055	36T	STIFFNESS, TABER
L321	Ø	58.0	64.4	-5.5	.7	1.15	36T	STIFFNESS, TABER
L692	Ø	58.5	63.9	-5.5	-.0	.09	36T	STIFFNESS, TABER
L250	*	60.0	64.0	-4.2	-1.1	1.16	36U	STIFFNESS, TABER, 20 C, 65% RH
L126	Ø	60.3	66.4	-2.3	.3	.05	36T	STIFFNESS, TABER
L731	Ø	60.4	65.9	-2.5	-.0	.070	36T	STIFFNESS, TABER
L150	Ø	60.6	67.6	-1.2	.9	.053	36T	STIFFNESS, TABER
L442	Ø	60.0	64.3	-3.5	-1.3	.062	36T	STIFFNESS, TABER
L228	*	60.9	71.8	2.1	3.6	1.26	36T	STIFFNESS, TABER
L703	Ø	61.1	66.5	-1.7	-.2	1.00	36T	STIFFNESS, TABER
L324	Ø	61.1	66.6	-1.0	-.1	.06	36T	STIFFNESS, TABER
L315	Ø	61.1	63.8	-3.0	-2.0	1.41	36T	STIFFNESS, TABER
L243	Ø	61.2	64.8	-2.8	-1.4	.054	36T	STIFFNESS, TABER
L339	Ø	61.3	67.0	-1.1	.0	.097	36T	STIFFNESS, TABER
L182	Ø	61.6	68.8	.4	1.0	.050	36T	STIFFNESS, TABER
L212	Ø	61.9	66.0	-1.4	-1.1	1.03	36T	STIFFNESS, TABER
L122	Ø	62.1	67.1	-.5	-.5	1.04	36U	STIFFNESS, TABER, DIGITAL READOUT
L230	Ø	62.2	68.5	.0	.4	1.00	36T	STIFFNESS, TABER
L580	Ø	62.3	66.3	-1.0	-1.2	.060	36T	STIFFNESS, TABER
L158	Ø	62.6	71.5	3.1	2.1	.053	36T	STIFFNESS, TABER
L262	Ø	62.8	67.2	.1	-1.0	.059	36T	STIFFNESS, TABER
L242	Ø	63.1	73.1	4.5	2.9	1.43	36T	STIFFNESS, TABER
L268	Ø	63.4	68.5	1.4	-.5	.062	36T	STIFFNESS, TABER
L729	Ø	63.5	67.7	.9	-1.1	1.26	36T	STIFFNESS, TABER
L163	Ø	64.1	69.5	2.0	-.3	1.07	36T	STIFFNESS, TABER
L651	Ø	64.2	72.1	4.0	1.4	.070	36T	STIFFNESS, TABER
L207	Ø	64.3	71.1	3.9	.0	1.05	36T	STIFFNESS, TABER
L107A	Ø	64.5	70.5	3.0	.1	1.47	36T	STIFFNESS, TABER
L281	Ø	64.6	71.3	4.5	.5	1.15	36T	STIFFNESS, TABER
L123	Ø	64.9	67.5	1.7	-2.3	1.01	36T	STIFFNESS, TABER
L616	#	65.5	30.7	-24.8	-27.8	1.03	36T	STIFFNESS, TABER
L739	Ø	65.8	70.4	4.4	-1.0	.066	36T	STIFFNESS, TABER
L604	Ø	66.2	70.5	4.8	-1.2	1.09	36T	STIFFNESS, TABER
L570	Ø	67.9	71.8	6.9	-1.5	1.20	36T	STIFFNESS, TABER
L348	Ø	68.7	74.0	9.0	-.6	1.37	36T	STIFFNESS, TABER
L388	#	88.5	97.5	39.7	.9	1.07	36T	STIFFNESS, TABER
GMEANS:		62.1	67.8			1.00		
		95% ELLIPSE:		11.4	3.4	WITH GAMMA = 47 DEGREES		

STIFFNESS, TABER

SAMPLE Z02 = 62.1 TABER UNITS SAMPLE Z17 = 67.8 TABER UNITS



ANALYSIS T49-1 TABLE 1

SURFACE PICK STRENGTH, $\dot{\gamma}$ - VISCOSITY VELOCITY PRODUCT (VVP) IN KILOPOISE CENTIMETERS/SECOND
TAPPI SUGGESTED METHODS T514 SU-69 AND T499 SU-64

LAB CODE	SAMPLE J56					SAMPLE H81					TEST D ₀ = 4		
	MEAN	DEV	PRINTING 93 GRAMS PER SQUARE METER		R ₀ SDR	MEAN	DEV	PRINTING 84 GRAMS PER SQUARE METER		R ₀ SDR	VAR	F	LAB
			N ₀ DEV	SDR				N ₀ DEV	SDR				
L182I	120.5	-2.9	-0.09	7.0	1.55	91.1	.7	.03	5.2	.96	49Q	Ø	L182I
L190C	82.5	-40.9	-1.023	1.0	.22	51.2	-39.2	-1.065	3.4	.63	49T	Ø	L190C
L207	128.7	5.4	.10	2.9	.64	89.0	-1.4	-.06	4.8	.88	49I	Ø	L207
L242	71.7	-51.7	-1.030	4.9	1.09	57.5	-32.9	-1.039	5.2	.96	49Q	Ø	L242
L280	150.3	27.0	.01	7.0	1.57	98.6	8.2	.34	8.0	1.48	49Q	Ø	L280
L291	94.6	-28.8	-.057	6.9	1.55	71.2	-19.2	-.81	6.5	1.20	49I	Ø	L291
L313	114.0	-9.4	-.020	.0	.00	89.5	-.9	-.04	3.0	.55	49Q	Ø	L313
L388	186.3	62.9	1.090	10.3	2.31	129.6	39.2	1.065	12.5	2.30	49Q	Ø	L388
L598	141.6	18.2	.000	2.8	.62	127.2	36.8	1.055	2.8	.51	49W	Ø	L598
L643	162.5	39.1	1.018	6.0	1.33	103.6	13.2	.56	4.4	.81	49I	Ø	L643
L738	119.7	-3.0	-.11	3.0	.78	82.2	-8.2	-.34	5.6	1.03	49I	Ø	L738
L739	107.8	-15.6	-.047	1.0	.34	94.2	3.8	.16	3.7	.69	49I	Ø	L739

GR₀ MEAN = 123.4 KP CM/SEC

GRAND MEAN = 90.4 KP CM/SEC

TEST DETERMINATIONS = 4

SD MEANS = 33.2 KP CM/SEC

SD OF MEANS = 23.7 KP CM/SEC

12 LABS IN GRAND MEANS

AVERAGE SDR = 4.0 KP CM/SEC

AVERAGE SDR = 5.4 KP CM/SEC

TOTAL NUMBER OF LABORATORIES REPORTING = 12

ANALYSIS T49-1 TABLE 2

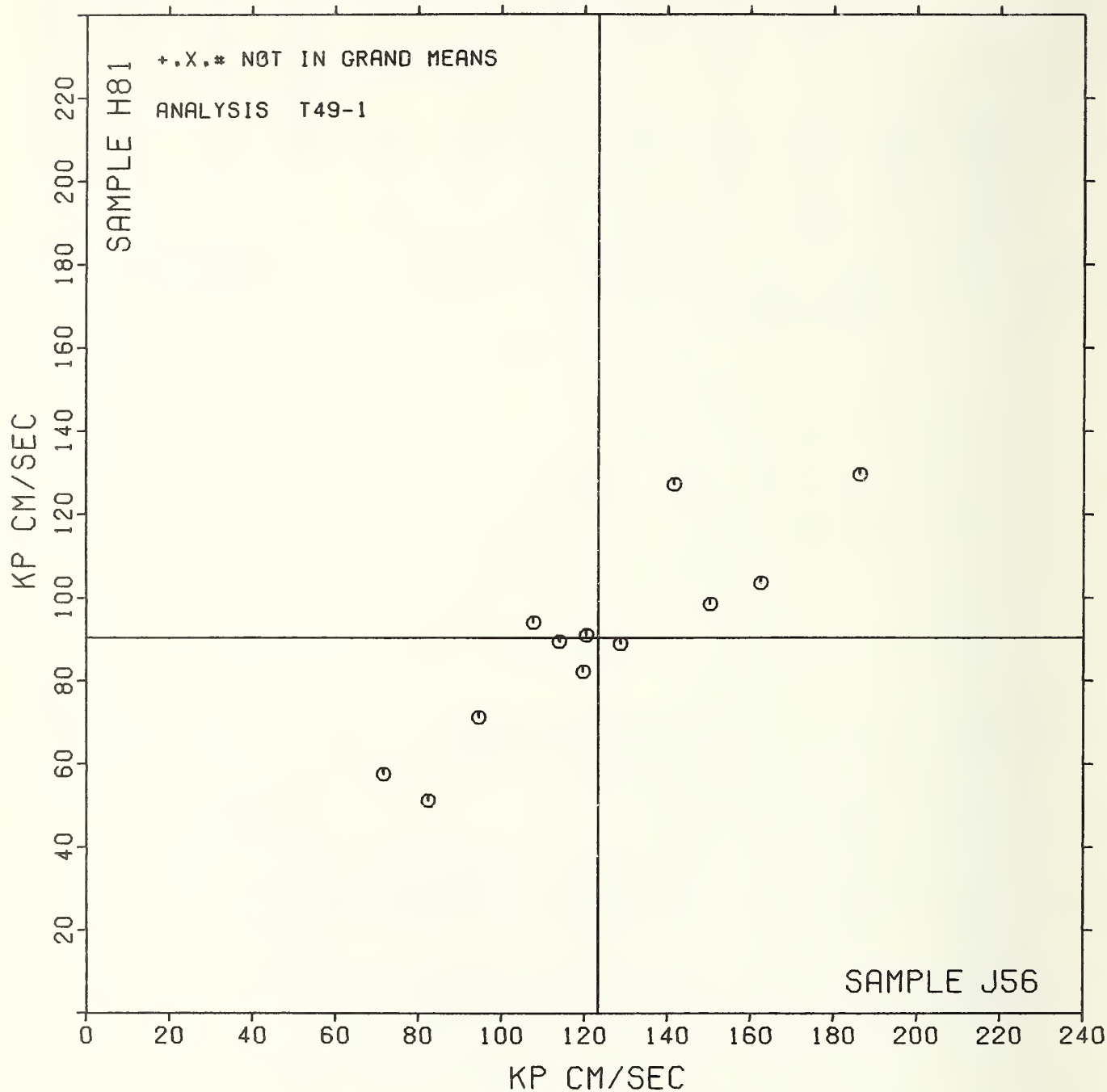
SURFACE PICK STRENGTH, $\dot{\gamma}$ - VISCOSITY VELOCITY PRODUCT (VVP) IN KILOPOISE CENTIMETERS/SECOND
TAPPI SUGGESTED METHODS T514 SU-69 AND T499 SU-64

LAB CODE	F	MEANS		COORDINATES		AVG		PROPERTY---TEST INSTRUMENT---CONDITIONS					
		J56	H81	MAJOR	MINOR	R ₀ SDR	VAR						
L242	Ø	71.7	57.5	-0.02	2.2	1.02	49Q	SURFACE PICK STRENGTH, IGT, IGT OIL					
L190C	Ø	82.5	51.2	-0.09	-9.1	.43	49T	SURFACE PICK STRENGTH, IGT, IPC FLUID					
L291	Ø	94.6	71.2	-3.06	.5	1.36	49I	SURFACE PICK STRENGTH, IGT, PIB FLUID					
L739	Ø	107.8	94.2	-1.07	11.9	.51	49I	SURFACE PICK STRENGTH, IGT, PIB FLUID					
L313	Ø	114.0	89.5	-.82	4.5	.28	49Q	SURFACE PICK STRENGTH, IGT, IGT OIL					
L738	Ø	119.7	82.2	-7.0	-4.7	.90	49I	SURFACE PICK STRENGTH, IGT, PIB FLUID					
L182I	Ø	120.5	91.1	-2.0	2.2	1.02	49Q	SURFACE PICK STRENGTH, IGT, IGT OIL					
L207	Ø	128.7	89.0	3.0	-4.2	.76	49I	SURFACE PICK STRENGTH, IGT, PIB FLUID					
L598	Ø	141.6	127.2	35.9	20.0	.56	49W	SURFACE PICK STRENGTH, IGT, OIL					
L280	Ø	150.3	98.6	20.9	-8.6	1.52	49Q	SURFACE PICK STRENGTH, IGT, IGT OIL					
L643	Ø	162.5	103.6	39.7	-11.3	1.07	49I	SURFACE PICK STRENGTH, IGT, PIB FLUID					
L388	Ø	186.3	129.6	74.1	-3.4	2.30	49Q	SURFACE PICK STRENGTH, IGT, IGT OIL					
GMEANS:		123.4	90.4			1.00							
		95% ELLIPSE:		119.0	27.3	WITH GAMMA = 34 DEGREES							

SURFACE PICK STRENGTH, IGT

SAMPLE J56 = 123. KP CM/SEC

SAMPLE H81 = 90. KP CM/SEC



ANALYSIS T50-1 TABLE 1

SURFACE PICK STRENGTH, WAX NUMBER

TAPPI OFFICIAL TEST METHOD 1459 03-75, SURFACE STRENGTH OF PAPER (WAX PICK TEST)

LAB CODE	SAMPLE J56		PRINTING 93 GRAMS PER SQUARE METER				SAMPLE H81		PRINTING 84 GRAMS PER SQUARE METER				TEST D ₀ = 5		
	MEAN	DEV	N ₀ DEV	SDR	2 ₀ SDR		MEAN	DEV	N ₀ DEV	SDR	R ₀ SDR		VAR	F	LAB
L105	10.80	-1.52	-1.01	.45	.79		10.60	-.80	-.62	.55	.98		50W	0	L105
L115	12.20	-.12	-.00	.64	1.48		12.00	.60	.46	.71	1.27		50W	0	L115
L122	13.00	.68	.40	.00	.00		10.60	-.80	-.62	.55	.98		50W	0	L122
L158	13.20	.68	.09	.45	.79		11.60	.20	.15	.55	.98		50W	0	L158
L162	13.60	1.28	.00	.50	.97		12.20	.80	.62	.45	.80		50W	0	L162
L182W	12.80	.48	.02	.40	.79		11.20	-.20	-.15	.45	.80		50W	0	L182W
L183	13.60	1.28	.00	.89	1.58		12.80	1.40	1.08	.84	1.50		50W	0	L183
L195	13.00	.68	.40	.00	.00		11.40	.00	.00	.55	.98		50W	0	L195
L213	13.40	1.08	.72	.00	.97		12.80	1.40	1.08	.45	.80		50W	0	L213
L225	14.00	1.68	1.12	.00	.00		13.00	1.60	1.24	.00	.00		50W	0	L225
L228	10.20	-2.12	-1.41	.45	.79		9.20	-2.20	-1.70	.45	.80		50W	0	L228
L230	12.80	.48	.02	.40	.79		10.60	-.80	-.62	.55	.98		50W	0	L230
L243	9.00	-3.32	-2.01	.71	1.20		8.40	-3.00	-2.32	.55	.98		50W	0	L243
L285	9.60	-2.72	-1.81	.89	1.58		11.80	.40	.31	.84	1.50		50W	*	L285
L339	12.00	-.32	-.21	1.22	2.16		11.20	-.20	-.15	1.30	2.34		50W	0	L339
L616	13.20	.88	.09	.40	.79		13.40	2.00	1.55	.55	.98		50W	0	L616
L697	11.60	-.72	-.40	.89	1.58		10.60	-.80	-.62	.55	.98		50W	0	L697
L729	13.80	1.48	.09	1.30	2.30		11.80	.40	.31	.45	.80		50W	0	L729

GR. MEAN = 12.32 WAX NUMBER

GRAND MEAN = 11.40 WAX NUMBER

TEST DETERMINATIONS = 5

SD MEANS = 1.50 WAX NUMBER

SD OF MEANS = 1.29 WAX NUMBER

18 LABS IN GRAND MEANS

AVERAGE SDR = .57 WAX NUMBER

AVERAGE SDR = .56 WAX NUMBER

TOTAL NUMBER OF LABORATORIES REPORTING = 18

Best values: J56 12.6 ± 2.3 wax number

H81 11.5 ± 2.0 wax number

ANALYSIS T50-1 TABLE 2

SURFACE PICK STRENGTH, WAX NUMBER

TAPPI OFFICIAL TEST METHOD 1459 03-75, SURFACE STRENGTH OF PAPER (WAX PICK TEST)

LAB CODE	F	MEANS		COORDINATES		AVG E ₀ SDR VAX	PROPERTY---TEST INSTRUMENT---CONDITIONS								
		J56	H81	MAJOR	MINOR										
L243	0	9.00	8.40	-4.47	-.23	1.12	50W	SURFACE PICK STRENGTH,	WAX	(TAPPI T459 0S75)					
L285	*	9.60	11.80	-1.86	2.03	1.04	50W	SURFACE PICK STRENGTH,	WAX	(TAPPI T459 0S75)					
L228	0	10.20	9.20	-3.03	-.37	.00	50W	SURFACE PICK STRENGTH,	WAX	(TAPPI T459 0S75)					
L105	0	10.80	10.60	-1.69	.34	.09	50W	SURFACE PICK STRENGTH,	WAX	(TAPPI T459 0S75)					
L697	0	11.60	10.60	-1.07	-.17	1.26	50W	SURFACE PICK STRENGTH,	WAX	(TAPPI T459 0S75)					
L339	0	12.00	11.20	-.08	.05	2.20	50W	SURFACE PICK STRENGTH,	WAX	(TAPPI T459 0S75)					
L115	0	12.20	12.00	.20	.54	1.37	50W	SURFACE PICK STRENGTH,	WAX	(TAPPI T459 0S75)					
L182W	0	12.80	11.20	.24	-.40	.00	50W	SURFACE PICK STRENGTH,	WAX	(TAPPI T459 0S75)					
L230	0	12.80	10.60	-.13	-.92	.09	50W	SURFACE PICK STRENGTH,	WAX	(TAPPI T459 0S75)					
L195	0	13.00	11.40	.03	-.43	.49	50W	SURFACE PICK STRENGTH,	WAX	(TAPPI T459 0S75)					
L122	0	13.00	10.60	.02	-1.05	.45	50W	SURFACE PICK STRENGTH,	WAX	(TAPPI T459 0S75)					
L616	0	13.20	13.40	1.94	1.00	.09	50W	SURFACE PICK STRENGTH,	WAX	(TAPPI T459 0S75)					
L158	0	13.20	11.60	.81	-.40	.09	50W	SURFACE PICK STRENGTH,	WAX	(TAPPI T459 0S75)					
L213	0	13.40	12.80	1.72	.41	.08	50W	SURFACE PICK STRENGTH,	WAX	(TAPPI T459 0S75)					
L162	0	13.60	12.20	1.00	-.19	.08	50W	SURFACE PICK STRENGTH,	WAX	(TAPPI T459 0S75)					
L183	0	13.60	12.80	1.87	.28	1.04	50W	SURFACE PICK STRENGTH,	WAX	(TAPPI T459 0S75)					
L729	0	13.80	11.80	1.40	-.62	1.00	50W	SURFACE PICK STRENGTH,	WAX	(TAPPI T459 0S75)					
L225	0	14.00	13.00	2.31	.18	.00	50W	SURFACE PICK STRENGTH,	WAX	(TAPPI T459 0S75)					
GMEANS:		12.32	11.40			1.00									
		95% ELLIPSE:		0.12	2.01										WITH GAMMA = 39 DEGREES

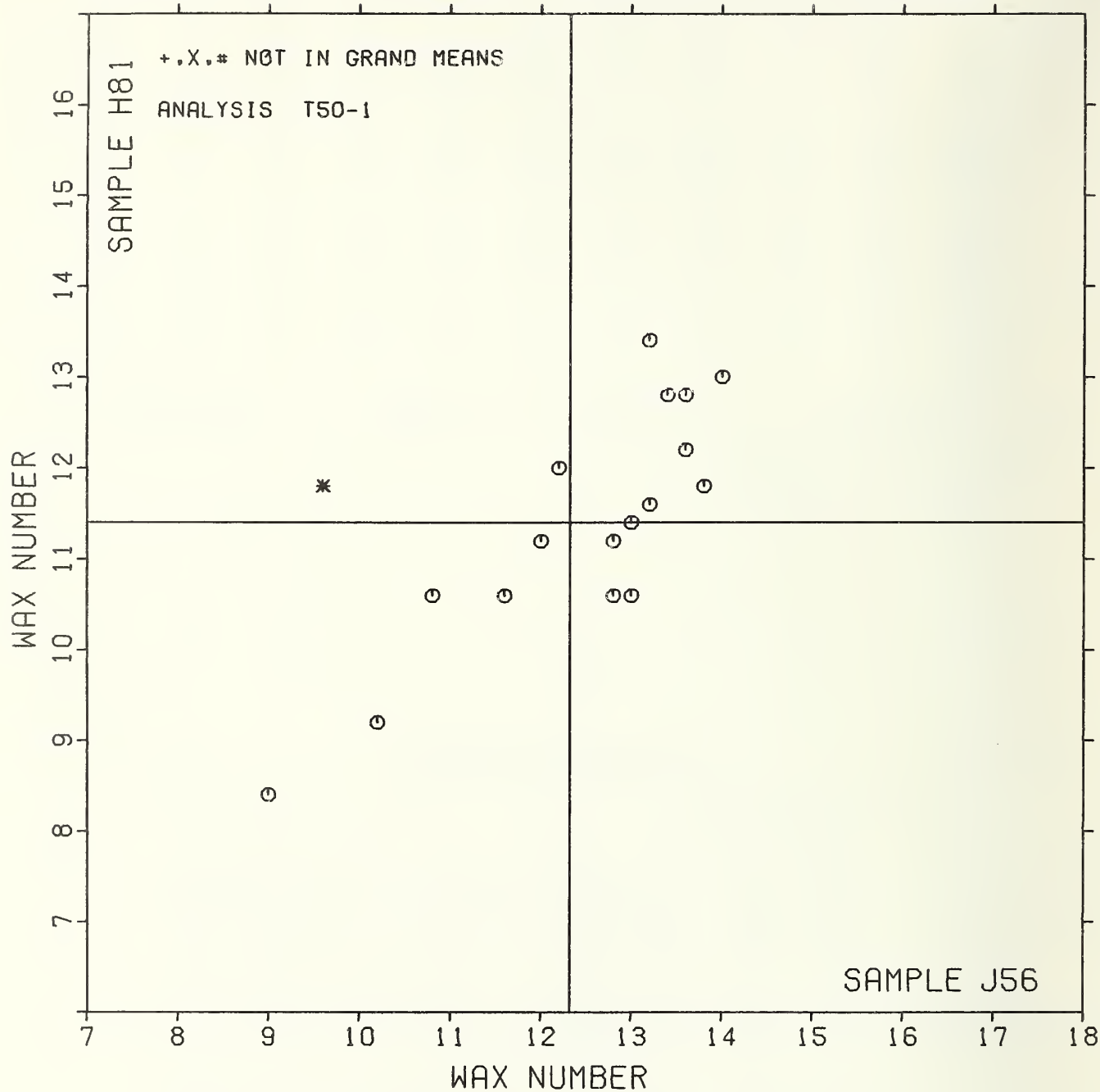
SURFACE PICK STRENGTH, WAX

SAMPLE J56 = 12.3

WAX NUMBER

SAMPLE H81 = 11.4

WAX NUMBER



ANALYSIS T91-1 TABLE 1

CONCORA MEDIUM TEST, NEWTONS(CMT)

TAPPI OFFICIAL TEST METHOD T809 GS-71, FLAT CRUSH OF CORRUGATING MEDIUM

LAB CODE	SAMPLE 209 CORRUGATING MEDIUM 132 GRAMS PER SQUARE METER					SAMPLE 214 CORRUGATING MEDIUM 125 GRAMS PER SQUARE METER					TEST D ₀ = 10		
	MEAN	DEV	N ₀ DEV	SDR	R ₀ SDR	MEAN	DEV	N ₀ DEV	SDR	R ₀ SDR	VAR	F	LAB
L182	236.	-0.	-0.02	11.	0.94	314.	19.	0.75	21.	1.47	91N	Ø	L182
L185	251.	14.	0.00	15.	1.31	334.	40.	1.56	18.	1.23	91A	Ø	L185
L218	249.	12.	0.00	14.	1.21	274.	-20.	-0.79	12.	0.82	91A	Ø	L218
L242	186.	-50.	-2.037	13.	1.15	252.	-43.	-1.67	10.	0.71	91G	Ø	L242
L269	243.	6.	0.00	10.	0.87	291.	-3.	-0.13	14.	0.96	91P	Ø	L269
L280	272.	35.	1.00	13.	1.12	336.	41.	1.63	9.	0.62	91N	Ø	L280
L313	204.	-33.	-1.00	8.	0.67	254.	-40.	-1.58	10.	0.71	91L	Ø	L313
L329	234.	-2.	-0.12	9.	0.79	281.	-13.	-0.53	16.	1.06	91P	Ø	L329
L394	227.	-10.	-0.47	12.	1.02	280.	-14.	-0.56	14.	0.96	91P	Ø	L394
L621	229.	-8.	-0.30	17.	1.40	299.	4.	0.18	21.	1.43	91P	Ø	L621
L622	238.	1.	0.00	11.	0.92	310.	15.	0.60	8.	0.53	91N	Ø	L622
L650	253.	16.	0.70	7.	0.61	310.	16.	0.62	21.	1.47	91N	Ø	L650
L666	242.	6.	0.00	11.	0.91	298.	3.	0.12	16.	1.07	91S	Ø	L666
L733	250.	13.	0.02	12.	1.02	290.	-5.	-0.20	14.	0.96	91P	Ø	L733

GR₀ MEAN = 237. N(CMT)

GRAND MEAN = 295. N(CMT)

TEST DETERMINATIONS = 10

SD MEANS = 21. N(CMT)

SD OF MEANS = 25. N(CMT)

14 LABS IN GRAND MEANS

AVERAGE SDR = 12. N(CMT)

AVERAGE SDR = 15. N(CMT)

GR₀ MEAN = 53.25 POUNDS

GRAND MEAN = 60.21 POUNDS

TOTAL NUMBER OF LABORATORIES REPORTING = 14

Best values: 209 240 ± 40 newtons
 214 290 ± 40 newtons

ANALYSIS T91-1 TABLE 2

CONCORA MEDIUM TEST, NEWTONS(CMT)

TAPPI OFFICIAL TEST METHOD T809 GS-71, FLAT CRUSH OF CORRUGATING MEDIUM

LAB CODE	F	MEANS		COORDINATES		AVG		PROPERTY---TEST INSTRUMENT---CONDITIONS					
		Z09	Z14	MAJOR	MINOR	R0 SDR	VAR						
L242	Ø	186.	252.	-65.	13.	0.93	91G	FLAT CRUSH STRENGTH, CONCORA, GAYDON FLAT CRUSH TESTER					
L313	Ø	204.	254.	-32.	1.	0.69	91L	FLAT CRUSH STRENGTH, CONCORA, LIBERTY					
L394	Ø	227.	280.	-17.	-1.	0.99	91P	FLAT CRUSH STRENGTH, CONCORA, TMI/HINDE & DAUCH					
L621	Ø	229.	299.	-2.	9.	1.45	91P	FLAT CRUSH STRENGTH, CONCORA, TMI/HINDE & DAUCH					
L329	Ø	234.	281.	-12.	-0.	0.93	91P	FLAT CRUSH STRENGTH, CONCORA, TMI/HINDE & DAUCH					
L182	Ø	236.	314.	10.	12.	1.020	91N	FLAT CRUSH STRENGTH, CONCORA, TMI/HINDE & DAUCH					
L622	Ø	238.	310.	13.	8.	0.73	91N	FLAT CRUSH STRENGTH, CONCORA, TMI/HINDE & DAUCH					
L666	Ø	242.	298.	0.	-2.	0.99	91S	FLAT CRUSH STRENGTH, CONCORA, TOYO SEIKI (METHOD JIS-P-8126)					
L269	Ø	243.	291.	2.	-7.	0.91	91P	FLAT CRUSH STRENGTH, CONCORA, TMI/HINDE & DAUCH					
L218	Ø	249.	274.	-8.	-22.	1.002	91A	FLAT CRUSH STRENGTH, CONCORA, INSTRON					
L733	Ø	250.	290.	4.	-13.	0.99	91P	FLAT CRUSH STRENGTH, CONCORA, TMI/HINDE & DAUCH					
L185	Ø	251.	334.	40.	14.	1.027	91A	FLAT CRUSH STRENGTH, CONCORA, INSTRON					
L650	Ø	253.	310.	22.	-3.	1.004	91N	FLAT CRUSH STRENGTH, CONCORA, TMI/HINDE & DAUCH					
L280	Ø	272.	336.	54.	-2.	0.67	91N	FLAT CRUSH STRENGTH, CONCORA, TMI/HINDE & DAUCH					
GMEANS:		237.	295.			1.000							
		55% ELLIPSE:		91.	31.	W14H	GAMMA = 51 DEGREES						

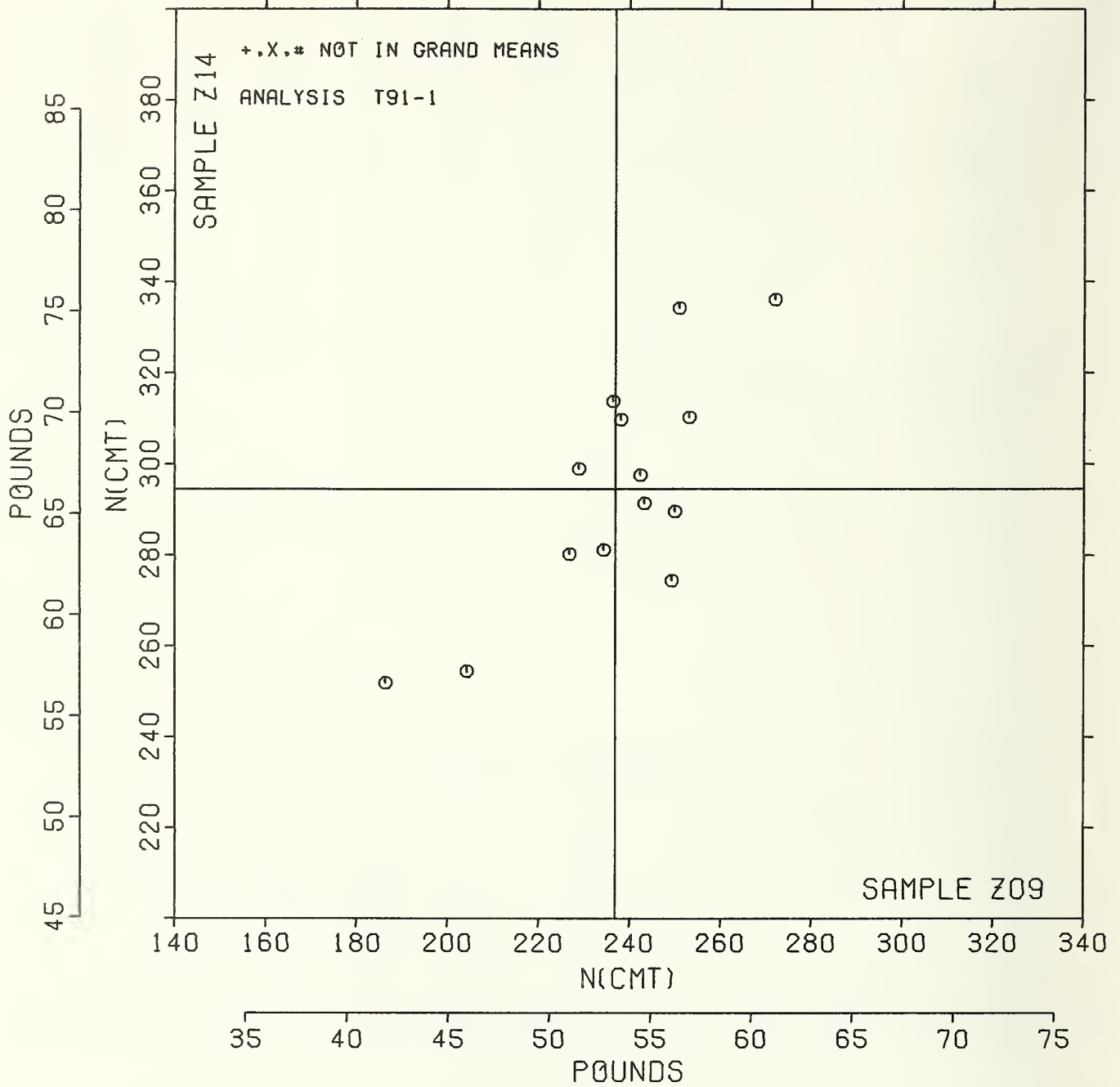
CONCORA (CMT)

SAMPLE Z09 = 237. N(CMT)

SAMPLE Z14 = 295. N(CMT)

SAMPLE Z09 = 53.3 POUNDS

SAMPLE Z14 = 66.2 POUNDS



ANALYSIS T90-1 TABLE 1
LANG CRUSH (COMPRESSION RESISTANCE OF PAPEFBOARD)
TAPPI OFFICIAL TEST METHOD T818 05-76

LAB CODE	SAMPLE Z12 132 GRAMS PER SQUARE METER					SAMPLE E61 194 GRAMS PER SQUARE METER					TEST D ₀ * 10		
	MEAN	DEV	N ₀ DEV	SDR	R ₀ SDR	MEAN	DEV	N ₀ DEV	SDR	R ₀ SDR	VAR	F	LAB
L107	172 ₀	-1 ₀	-0.07	11 ₀	1.07	328 ₀	-18 ₀	-0.45	10 ₀	0.50	96P	0	L107
L114	185 ₀	11 ₀	0.00	12 ₀	1.14	324 ₀	-22 ₀	-0.54	14 ₀	0.68	96P	0	L114
L122	150 ₀	-23 ₀	-1.07	22 ₀	2.09	326 ₀	-20 ₀	-0.51	30 ₀	1.43	96P	0	L122
L124	189 ₀	15 ₀	0.70	12 ₀	1.11	383 ₀	37 ₀	0.93	33 ₀	1.58	96P	0	L124
L126	168 ₀	-5 ₀	-0.20	11 ₀	1.00	349 ₀	3 ₀	0.07	15 ₀	0.73	96P	0	L126
L141	168 ₀	15 ₀	0.70	13 ₀	1.20	353 ₀	7 ₀	0.17	28 ₀	1.33	96P	0	L141
L157	161 ₀	-13 ₀	-0.00	11 ₀	1.00	304 ₀	-42 ₀	-1.05	15 ₀	0.72	96P	0	L157
L182	184 ₀	11 ₀	0.04	11 ₀	0.98	380 ₀	34 ₀	0.86	20 ₀	0.96	96N	0	L182
L191	204 ₀	30 ₀	1.02	11 ₀	1.00	411 ₀	65 ₀	1.65	11 ₀	0.50	96P	0	L191
L218	173 ₀	-1 ₀	-0.00	6 ₀	0.50	312 ₀	-34 ₀	-0.86	14 ₀	0.68	96I	0	L218
L234	153 ₀	-20 ₀	-1.04	10 ₀	1.01	272 ₀	-74 ₀	-1.87	48 ₀	2.31	96P	0	L234
L237	166 ₀	-8 ₀	-0.09	7 ₀	0.02	372 ₀	26 ₀	0.67	26 ₀	1.26	96P	0	L237
L242	194 ₀	20 ₀	1.02	0 ₀	0.58	373 ₀	27 ₀	0.69	11 ₀	0.51	96G	0	L242
L243	185 ₀	11 ₀	0.03	10 ₀	0.90	382 ₀	36 ₀	0.92	11 ₀	0.54	96P	0	L243
L303	181 ₀	8 ₀	0.40	28 ₀	2.01	359 ₀	14 ₀	0.34	15 ₀	0.70	96N	0	L303
L305	158 ₀	-16 ₀	-0.00	10 ₀	1.00	359 ₀	13 ₀	0.32	40 ₀	1.90	96P	0	L305
L329	198 ₀	25 ₀	1.00	7 ₀	0.00	360 ₀	34 ₀	0.86	6 ₀	0.27	96P	0	L329
L333	106 ₀	-7 ₀	-0.00	12 ₀	1.14	321 ₀	-25 ₀	-0.63	34 ₀	1.63	96P	0	L333
L336	155 ₀	-19 ₀	-0.00	0 ₀	0.55	353 ₀	7 ₀	0.19	26 ₀	1.26	96P	0	L336
L350	187 ₀	13 ₀	0.07	10 ₀	0.89	361 ₀	35 ₀	0.88	23 ₀	1.11	96P	0	L350
L393	173 ₀	-1 ₀	-0.00	8 ₀	0.75	351 ₀	5 ₀	0.13	17 ₀	0.83	96P	0	L393
L553	197 ₀	23 ₀	1.10	11 ₀	1.07	357 ₀	11 ₀	0.28	23 ₀	1.12	96P	0	L553
L562	149 ₀	-25 ₀	-1.00	15 ₀	1.07	290 ₀	-55 ₀	-1.40	23 ₀	1.09	96P	0	L562
L570	134 ₀	-39 ₀	-1.00	0 ₀	0.58	300 ₀	-39 ₀	-0.99	16 ₀	0.77	96P	0	L570
L580	225 ₀	52 ₀	2.00	12 ₀	1.14	412 ₀	66 ₀	1.67	9 ₀	0.42	96P	*	L580
L603	171 ₀	-2 ₀	-0.12	9 ₀	0.88	401 ₀	55 ₀	1.39	27 ₀	1.30	96P	0	L603
L610	185 ₀	11 ₀	0.00	9 ₀	0.88	370 ₀	24 ₀	0.61	16 ₀	0.74	96P	0	L610
L617	172 ₀	-2 ₀	-0.00	9 ₀	0.88	327 ₀	-19 ₀	-0.48	16 ₀	0.78	96P	0	L617
L621	169 ₀	-4 ₀	-0.24	9 ₀	0.84	376 ₀	30 ₀	0.76	30 ₀	1.46	96P	0	L621
L623	180 ₀	6 ₀	0.14	8 ₀	0.70	363 ₀	18 ₀	0.44	8 ₀	0.40	96P	0	L623
L625	123 ₀	-50 ₀	-2.00	10 ₀	1.02	243 ₀	-102 ₀	-2.59	17 ₀	0.80	96P	*	L625
L649	189 ₀	16 ₀	0.00	7 ₀	0.00	356 ₀	10 ₀	0.25	20 ₀	0.94	96P	0	L649
L650	174 ₀	1 ₀	0.00	7 ₀	0.00	358 ₀	12 ₀	0.31	17 ₀	0.79	96N	0	L650
L663	161 ₀	-13 ₀	-0.00	9 ₀	0.80	264 ₀	-62 ₀	-1.56	29 ₀	1.37	96P	0	L663
L676	175 ₀	1 ₀	0.00	8 ₀	0.72	346 ₀	0 ₀	0.01	25 ₀	1.22	96P	0	L676
L686	173 ₀	-1 ₀	-0.00	13 ₀	1.22	571 ₀	225 ₀	5.69	17 ₀	0.80	96P	#	L686
L703	154 ₀	-20 ₀	-1.00	9 ₀	0.88	287 ₀	-58 ₀	-1.47	12 ₀	0.57	96J	0	L703

GR₀ MEAN = 174.0 NEWTONS

SD MEANS = 20.0 NEWTONS

AVERAGE SDR =

GRAND MEAN = 346.0 NEWTONS

SD OF MEANS = 40.0 NEWTONS

SD OF MEANS =

TEST DETERMINATIONS = 10

36 LABS IN GRAND MEANS

AVERAGE SDR = 21.0 NEWTONS

GR₀ MEAN = 39.02 POUNDS

GRAND MEAN = 77.74 POUNDS

TOTAL NUMBER OF LABORATORIES REPORTING = 37

Best values: Z12 170 + 30 newtons

E61 350 + 60 newtons

TAPPI COLLABORATIVE REFERENCE PROGRAM
ANALYSIS T96-1 TABLE 2
RING CRUSH (COMPRESSION RESISTANCE OF PAPERBOARD)
TAPPI OFFICIAL TEST METHOD T818 6S-76

NOVEMBER 1979

LAB CODE	F	MEANS		COORDINATES		AVG MOISTURE VAR	PROPERTY--TEST INSTRUMENT--CONDITIONS				
		Z12	E61	MAJOR	MINOR						
L625	*	123.	243.	-114.	0.	1.16	96P	RING CRUSH,	TMI/HINDE	& DAUCH	
L570	Ø	124.	306.	-32.	21.	0.08	96P	RING CRUSH,	TMI/HINDE	& DAUCH	
L562	Ø	149.	290.	-01.	1.	1.02	96P	RING CRUSH,	TMI/HINDE	& DAUCH	
L122	Ø	150.	326.	-28.	13.	1.07	96P	RING CRUSH,	TMI/HINDE	& DAUCH	
L234	Ø	153.	272.	-70.	-11.	1.01	96P	RING CRUSH,	TMI/HINDE	& DAUCH	
L703	Ø	154.	287.	-01.	-5.	0.73	96P	RING CRUSH,	INSTRON		
L336	Ø	155.	353.	-1.	20.	0.90	96P	RING CRUSH,	TMI/HINDE	& DAUCH	
L305	Ø	158.	359.	0.	20.	1.07	96P	RING CRUSH,	TMI/HINDE	& DAUCH	
L663	Ø	161.	284.	-02.	-12.	1.11	96P	RING CRUSH,	TMI/HINDE	& DAUCH	
L157	Ø	161.	304.	-43.	-4.	0.00	96P	RING CRUSH,	TMI/HINDE	& DAUCH	
L237	Ø	166.	372.	21.	17.	0.94	96P	RING CRUSH,	TMI/HINDE	& DAUCH	
L333	Ø	166.	321.	-20.	-3.	1.09	96P	RING CRUSH,	TMI/HINDE	& DAUCH	
L126	Ø	168.	349.	1.	0.	0.00	96P	RING CRUSH,	TMI/HINDE	& DAUCH	
L621	Ø	169.	376.	20.	10.	1.10	96P	RING CRUSH,	TMI/HINDE	& DAUCH	
L603	Ø	171.	401.	00.	24.	1.09	96P	RING CRUSH,	TMI/HINDE	& DAUCH	
L617	Ø	172.	327.	-18.	-0.	0.03	96P	RING CRUSH,	TMI/HINDE	& DAUCH	
L107	Ø	172.	328.	-17.	-0.	0.79	96P	RING CRUSH,	TMI/HINDE	& DAUCH	
L686	#	173.	571.	207.	89.	1.01	96P	RING CRUSH,	TMI/HINDE	& DAUCH	
L393	Ø	173.	351.	4.	3.	0.79	96P	RING CRUSH,	TMI/HINDE	& DAUCH	
L218	Ø	173.	312.	-32.	-12.	0.02	96P	RING CRUSH,	INSTRON		
L650	Ø	174.	358.	12.	4.	0.73	96P	RING CRUSH,	TMI/HINDE	& DAUCH	
L676	Ø	175.	346.	1.	-1.	0.97	96P	RING CRUSH,	TMI/HINDE	& DAUCH	
L623	Ø	180.	363.	19.	1.	0.08	96P	RING CRUSH,	TMI/HINDE	& DAUCH	
L303	Ø	181.	359.	10.	-2.	1.00	96P	RING CRUSH,	TMI/HINDE	& DAUCH	
L182	Ø	184.	380.	30.	3.	0.97	96P	RING CRUSH,	TMI/HINDE	& DAUCH	
L114	Ø	185.	324.	-10.	-19.	0.91	96P	RING CRUSH,	TMI/HINDE	& DAUCH	
L243	Ø	185.	382.	38.	4.	0.70	96P	RING CRUSH,	TMI/HINDE	& DAUCH	
L610	Ø	185.	370.	27.	-1.	0.01	96P	RING CRUSH,	TMI/HINDE	& DAUCH	
L350	Ø	187.	381.	37.	2.	1.00	96P	RING CRUSH,	TMI/HINDE	& DAUCH	
L141	Ø	188.	353.	12.	-11.	1.02	96P	RING CRUSH,	TMI/HINDE	& DAUCH	
L124	Ø	189.	383.	40.	0.	1.00	96P	RING CRUSH,	TMI/HINDE	& DAUCH	
L649	Ø	189.	356.	10.	-11.	0.00	96P	RING CRUSH,	TMI/HINDE	& DAUCH	
L242	Ø	194.	373.	33.	-8.	0.04	96P	RING CRUSH,	GAYDON FLAT CRUSH	TESTER	
L553	Ø	197.	357.	19.	-17.	1.10	96P	RING CRUSH,	TMI/HINDE	& DAUCH	
L329	Ø	198.	380.	41.	-9.	0.46	96P	RING CRUSH,	TMI/HINDE	& DAUCH	
L191	Ø	204.	411.	72.	-2.	0.78	96P	RING CRUSH,	TMI/HINDE	& DAUCH	
L580	*	225.	412.	61.	-21.	0.73	96P	RING CRUSH,	TMI/HINDE	& DAUCH	
GMEANS:		174.	346.			1.00					
		55% ELLIPSE:		111.	30.			WIND GAMMA = 66 DEGREES			

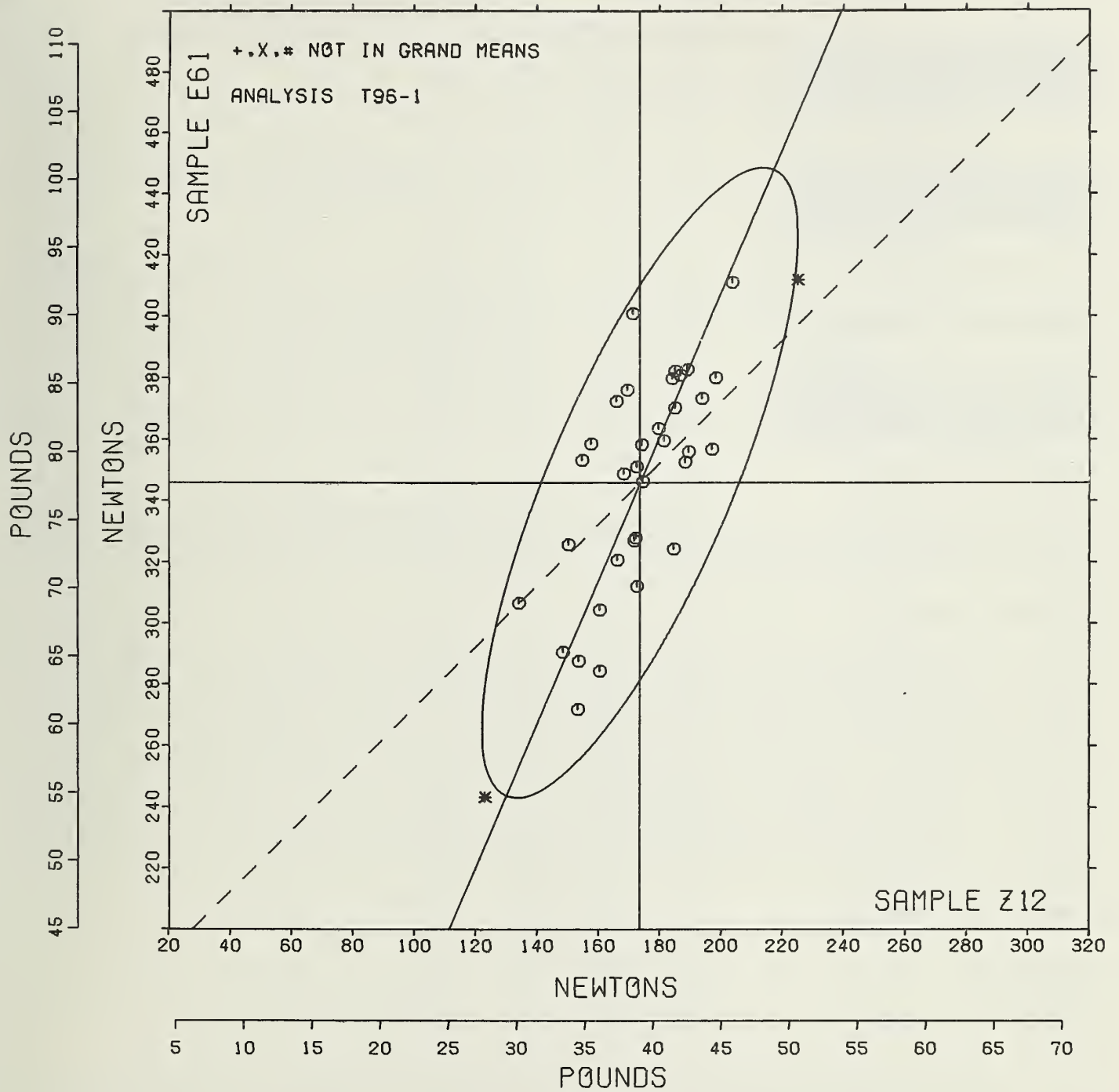
RING CRUSH

SAMPLE Z12 = 174. NEWTONS

SAMPLE E61 = 346. NEWTONS

SAMPLE Z12 = 39.0 POUNDS

SAMPLE E61 = 77.7 POUNDS



SUMMARY TABLE

TEST METHOD	SAMPLE CODE	GRAND MEAN	SD OF MEAN	AVER SDR	REPL CRP	LABS INCL	LABS PARTIC	REPL TAPPI	REPEAT	REPROD
BURSTING STRENGTH, MODEL C T10-1 PSI	K30 A57	28.2 31.9	2.1 2.4	2.0 2.2	15	45	57	10	1.7 1.9	6.0 6.8
BURSTING STRENGTH, MODEL C-A T10-2 PSI	K38 A57	27.0 30.9	2.3 2.3	1.7 1.8	15	40	40	10	1.5 1.6	6.4 6.5
BURSTING STRENGTH, HIGH RANGE T11-1 PSI	B63 415	62.0 75.7	4.0 3.2	3.8 5.3	15	39	54	10	3.3 4.7	11.1 9.2
TEARING STRENGTH, PRINTING PAPERS T15-1 GRAMS	B85 G15	39.35 51.06	2.15 2.36	1.21 1.56	15	118	148	10	1.06 1.37	5.98 6.59
TEARING STRENGTH, PACKAGING PAPERS T16-1 GRAMS	B63 G19	121.5 104.9	4.5 4.3	5.0 4.6	15	9	22	10	4.4 4.1	12.6 12.1
TENSILE STRENGTH, PACKAGING PAPERS T19-1 KILONEWTN/M	J02 G17	5.66 6.89	.29 .30	.23 .39	20	52	60	10	.20 .34	.83 .86
TENSILE STR., CRE, PRINTING PAPERS T20-1 KILONEWTN/M	J72 B95	3.70 4.56	.17 .26	.16 .23	20	44	56	10	.14 .20	.49 .73
TENSILE STR., PENDULUM, PRINTING P. T20-2 KILONEWTN/M	J72 B95	3.75 4.58	.19 .27	.16 .24	20	42	42	10	.14 .21	.53 .75
T.E.O.A., PACKAGING PAPERS T25-1 JOULES/SQ M	J02 G17	79.8 71.5	9.5 7.3	9.3 9.2	20	21	24	10	8.1 8.1	26.9 26.9
T.E.O.A., PRINTING PAPERS T26-1 JOULES/SQ M	J72 B95	43.1 43.5	4.6 3.9	5.3 5.5	20	18	19	10	4.7 4.8	13.6 11.2
ELONGATION TO BREAK, PACKAGING PAPER T28-1 PERCENT	J02 G17	2.131 1.046	.140 .153	.166 .129	20	21	25	10	.145 .113	.401 .432
ELONGATION TO BREAK, PRINTING PAPER T29-1 PERCENT	J72 B95	1.090 1.435	.231 .219	.151 .140	20	19	22	10	.132 .122	.646 .612
FOLDING ENDURANCE (MIT) T30-1 DOUBLE FOLDS	B30 B80	16.6 47.5	2.9 15.3	5.3 17.5	15	39	47	10	4.7 15.3	8.5 43.3
FOLDING ENDURANCE (MIT) T30-2 LOG(10) FOLD	B30 B80	1.20 1.63	.08 .17	.13 .17	15	40	47	10	.12 .15	.22 .48
STIFFNESS, GURLEY T35-1 GURLEY UNITS	K04 A58	245. 282.	14. 18.	13. 17.	10	29	37	10	12. 15.	39. 50.
STIFFNESS, TABER T36-1 TABER UNITS	Z02 417	62.1 67.8	3.1 3.3	2.3 2.3	10	35	38	5	2.9 2.8	8.9 9.4
SURFACE PICK STRENGTH, IGT T49-1 KP CM/SEC	J56 B81	123.4 90.4	33.2 23.7	4.5 5.4	4	12	12	4	6.2 7.5	91.9 65.7
SURFACE PICK STRENGTH, WAX T50-1 WAX NUMBER	J56 B81	12.32 11.40	1.50 1.29	.57 .56	5	18	18	5	.70 .69	4.16 3.58
CONCRETE (CMT) T91-1 N(CMT)	Z09 414	237. 295.	21. 25.	12. 15.	10	14	14	10	10. 13.	59. 70.
RING CRUSH T96-1 NEWTONS	Z12 B81	174. 346.	20. 40.	11. 21.	10	36	37	10	9. 18.	55. 110.

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